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Institution of Locomotive Engineers
GOLDEN JUBILEE EXHIBITION

This exhibition, arranged by the British Transport Commission, included electric, Diesel-electric, Diesel-hydraulic and steam locomotives, with axles running in Timken bearings.

Timken bearings are also used extensively in the British Railways' modernization programme, on freight wagons and other rolling stock.

British Timken, Duston, Northampton, Division of The Timken Roller Bearing Company. Timken bearings manufactured in England, Australia, Brazil, Canada, France and U.S.A.

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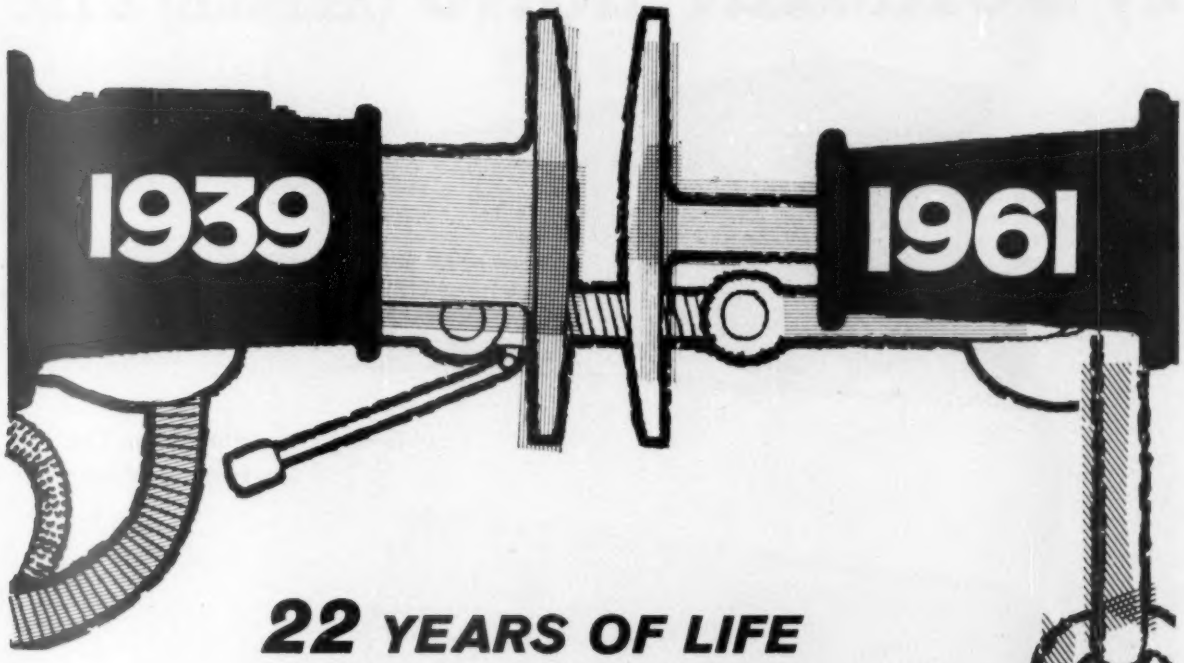
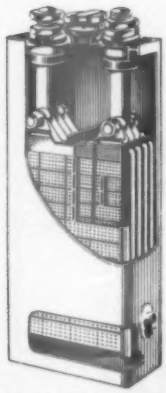


22 YEARS OF LIFE FROM NIFE

Nife diesel starting batteries installed on British Railways locomotives in 1939 are still giving first-class service today. Good reason why far-sighted engineers are today specifying Nife batteries for this purpose as well as for Train Lighting, Automatic Train Control, Switchgear Operation and all forms of Track and Signal Control.



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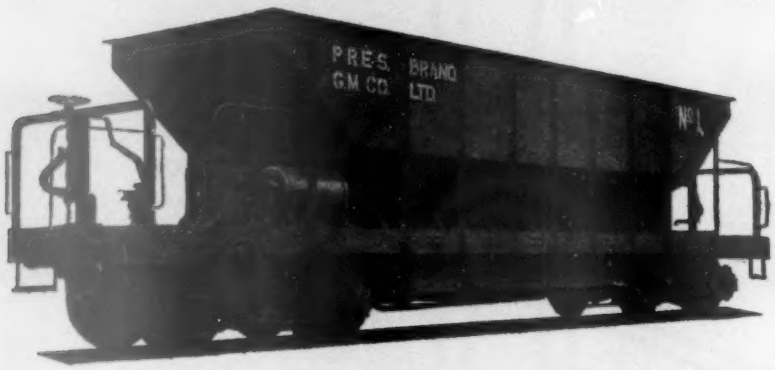
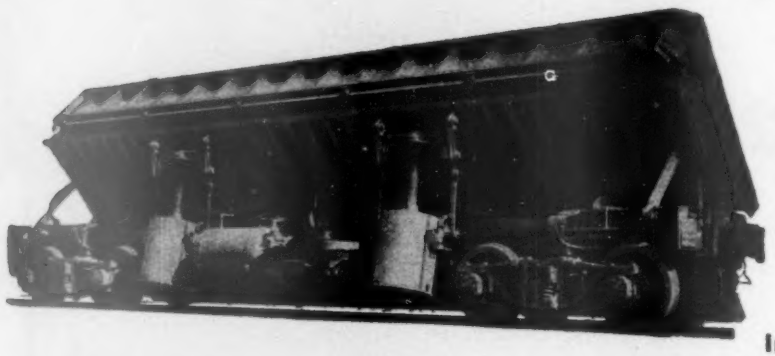
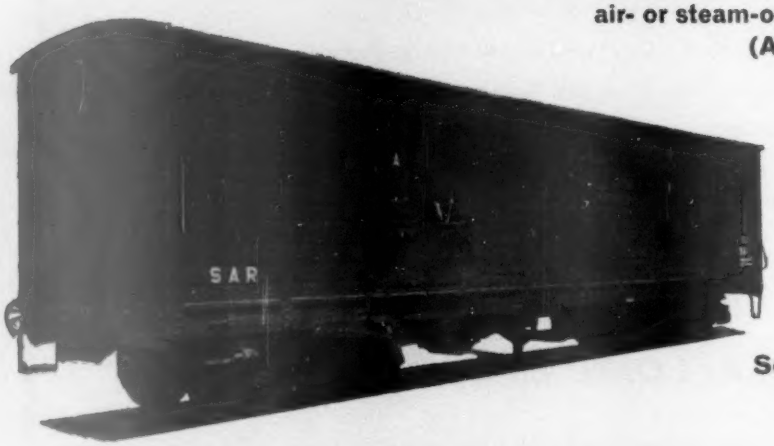


President Brand Gold Mining Co. Ltd.
50 Ton Ore Hopper Wagon



South African
Iron and Steel
Industrial Corporation
air- or steam-operated Dump Wagon
(Austin-Western patent)



South African Railways
Bogie Fruit Wagon

DORMAN LONG (AFRICA) LIMITED

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Westinghouse Brakes for East Africa

One of ten . . . . .

'ENGLISH ELECTRIC'

"90" Class metre-gauge locomotives being supplied for the East African Railways & Harbours Administration.

These locomotives are fitted with the

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AUTOMATIC BRAKE

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India—Saxby & Farmer (India) Private Ltd., Calcutta
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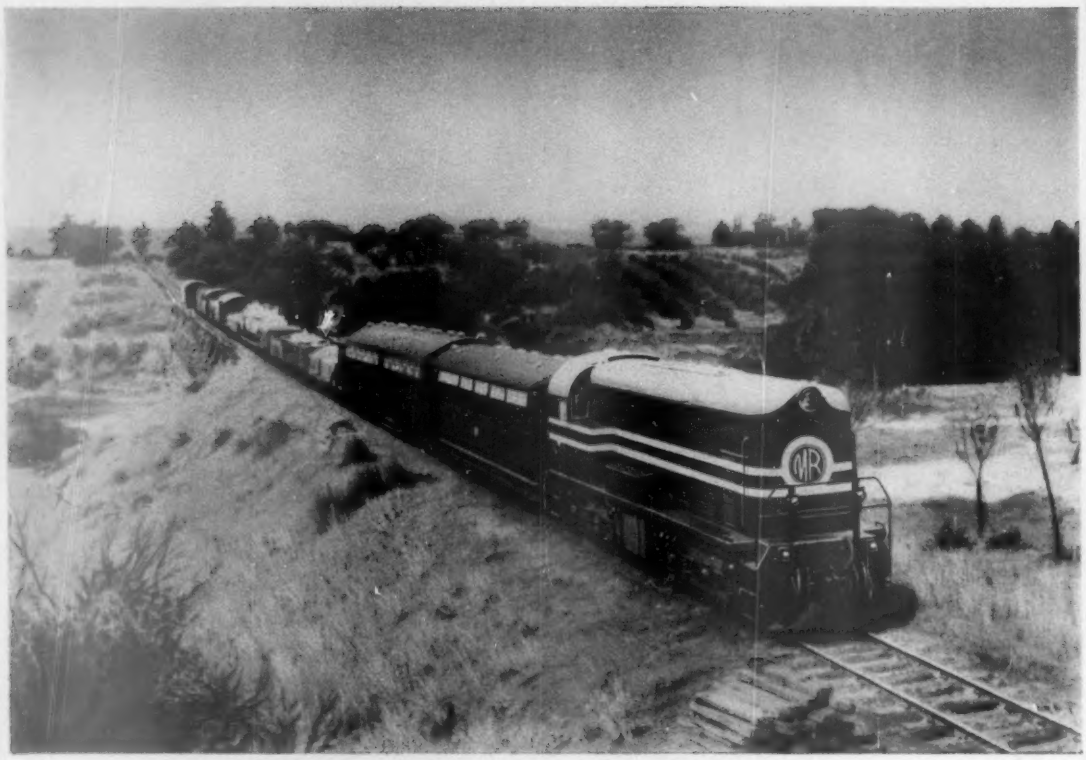
Agents—Bellamy & Lambie, Johannesburg

Over Eighty Years of Braking



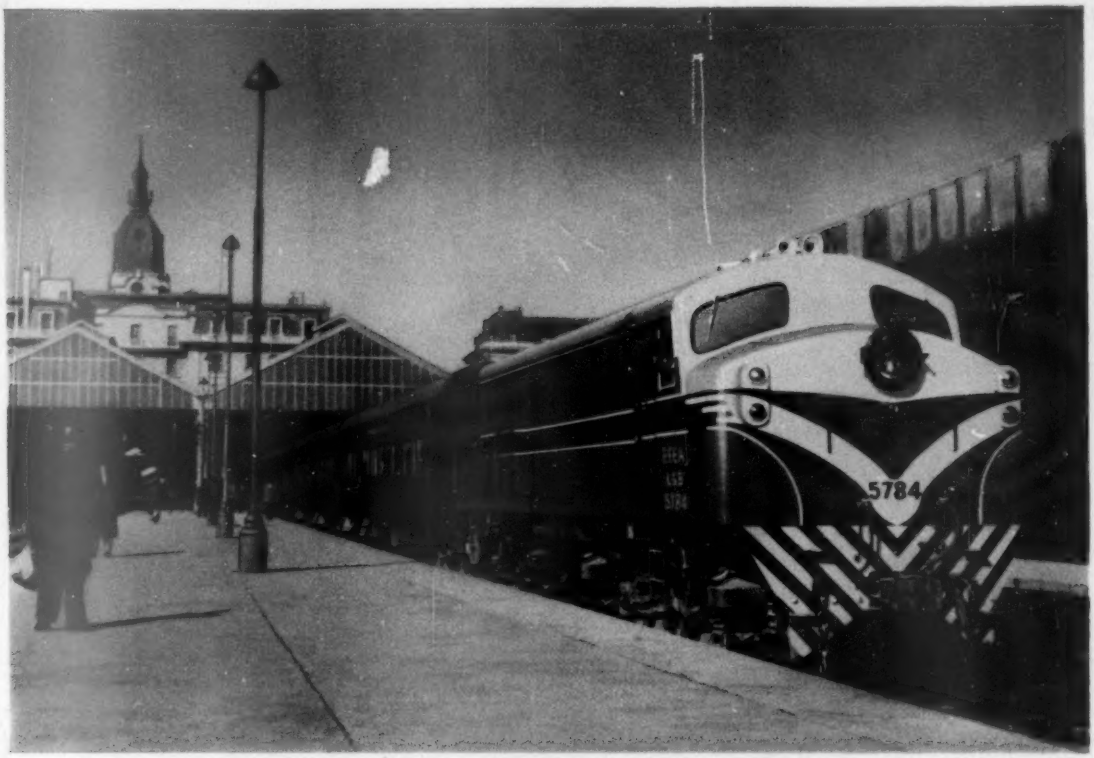
Seven 790 h.p. diesel-electric locomotives have been supplied by 'ENGLISH ELECTRIC' for use on the Midland Railway of Western Australia. The mechanical parts of the locomotives were designed and built by 'ENGLISH ELECTRIC' in Australia.

'ENGLISH ELECTRIC' diesel-electric locomotives are in operation throughout the world. On all duties, including intensive

'ENGLISH

in association with: VULCAN FOUNDRY

TDD.85



Twenty-one of these 'ENGLISH ELECTRIC' 1,000 h.p. general purpose diesel-electric locomotives are in service with the General Belgrano Railway, Argentine. Similar locomotives are also in service in Brazil.

suburban services as in the Argentine and mixed traffic work in Australia, they are well-known for trouble-free working.

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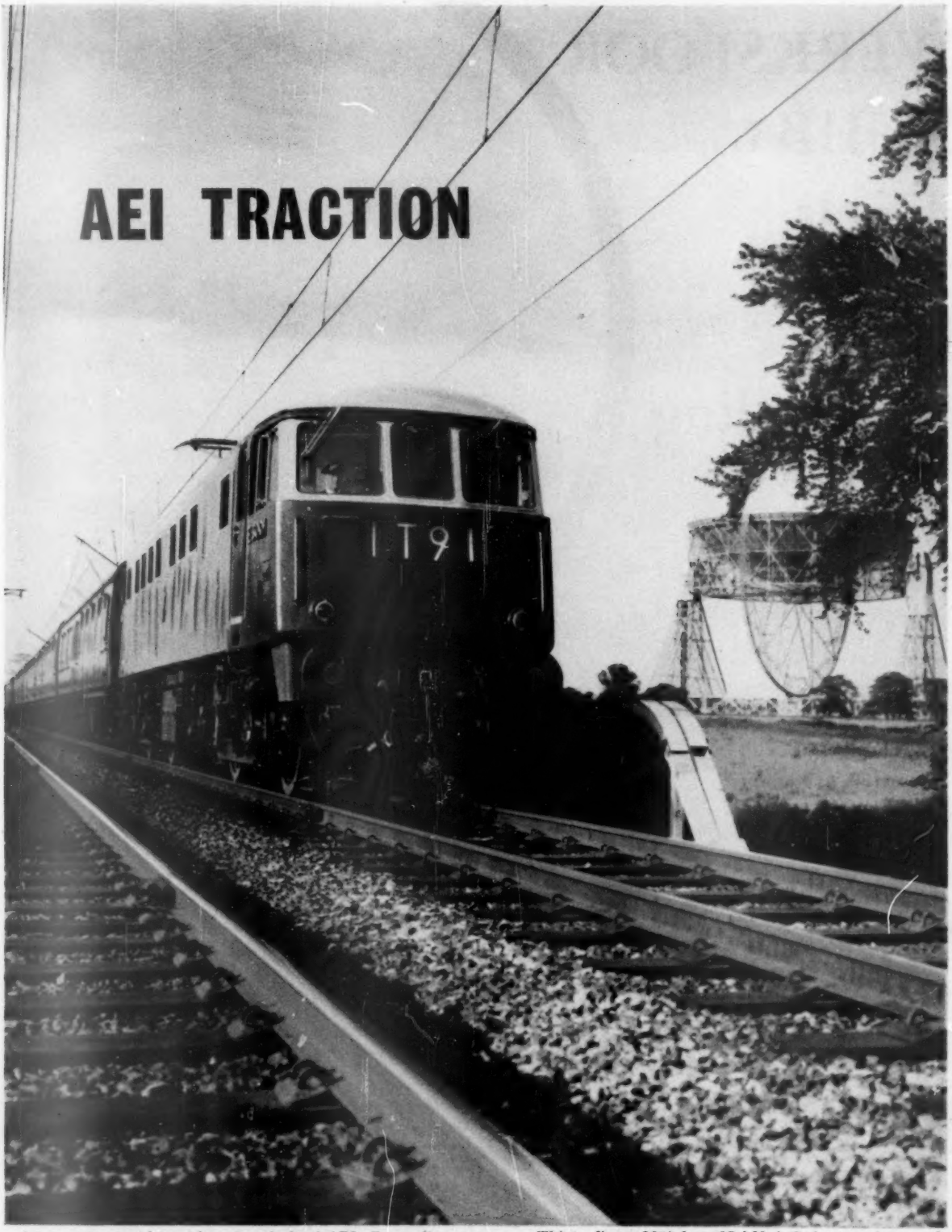

All enquiries should be addressed to the local AEI office or direct to AEI Traction Division, Trafford Park, Manchester 17.

Thirty-five—3300 h.p. 25 kV A.C. locomotives, and forty sets of locomotive electrical equipment have been ordered from AEI by British Railways.

AEI **Associated Electrical Industries Ltd.**

Traction Division

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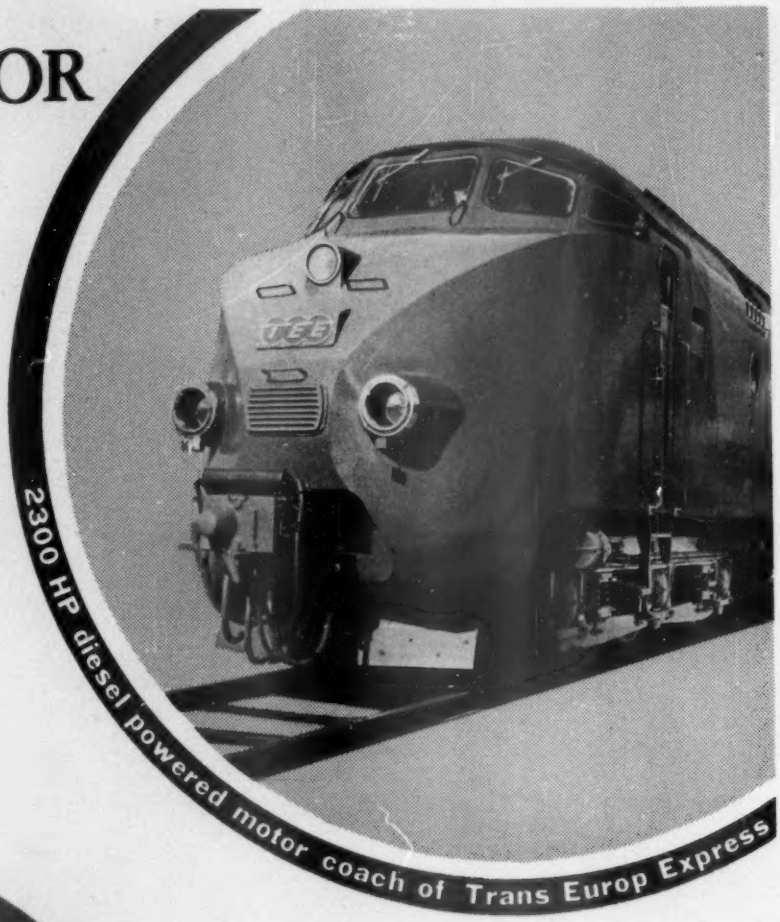

One of the RUHB 1616 power units of 1,000 HP for Continental Europe's latest and most luxurious trains, the Trans Europ Express

Many users report that their Werkspoor RUHB and RUB high-speed diesel engines have covered 300,000 miles (8 - 10,000 running hours) before needing any overhaul. Frequently, these pre-overhaul distances and times have been greatly exceeded.

Here are some figures of measured wear after 10,000 hours of service.

Cylinder liners (chromium plated)
0·03 to 0·04 mm (0·0012 in. to 0·0016 in.)

Crankshaft bearings (copper lead)
0·02 to 0·03 mm (0·0008 in. to 0·0012 in.)

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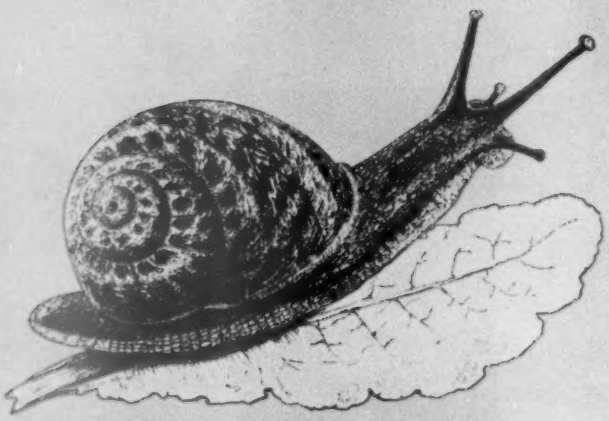

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The snail, most thoughtfully, goes to some pains to reconcile his own needs with those of the conchologist • As home and protection, his shell must be tough, portable, and very much made to measure. At the same time, it must have just those qualities which—in due course—will delight the collector • Sheet steel from the City of Steel follows no less closely its intended purpose • Each order is treated as a separate assignment so that you, the manufacturer, get the particular kind of steel your product needs • Steel, in fact, made to measure—to your exact requirements.

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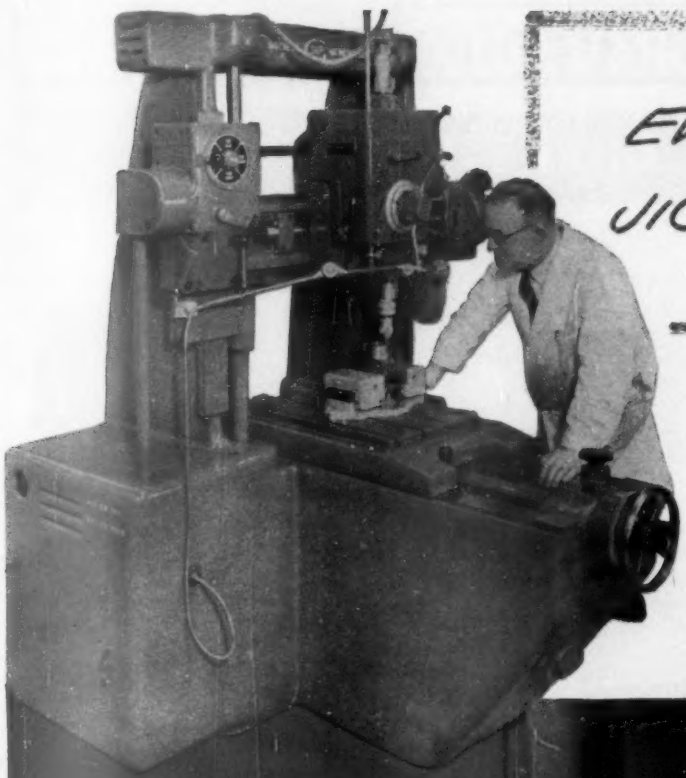

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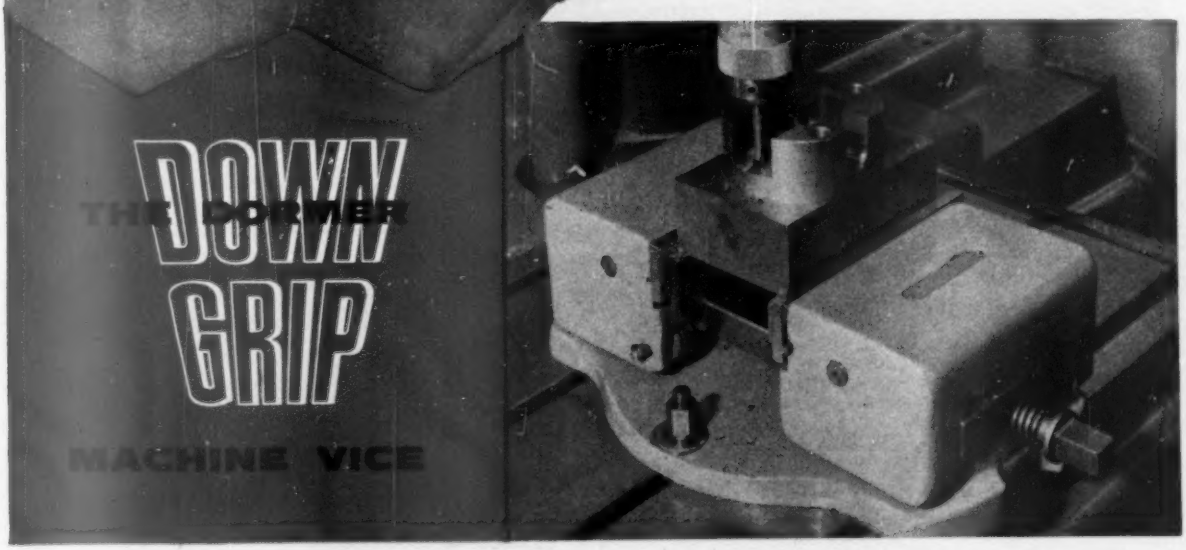
Here is a Machine Vice with built-in precision. As its name implies, it actually grips the work hard down on to its table or parallels. An accurate set-up in seconds.

The illustrations show the boring of a location pin hole in a fuel pump assembly fixture at the premises of Messrs. AC-Delco, Liverpool, by whose courtesy the photographs are reproduced.



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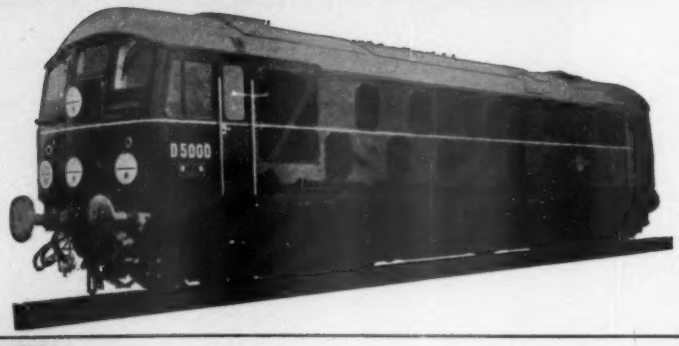
MODERN BRAKE EQUIPMENT

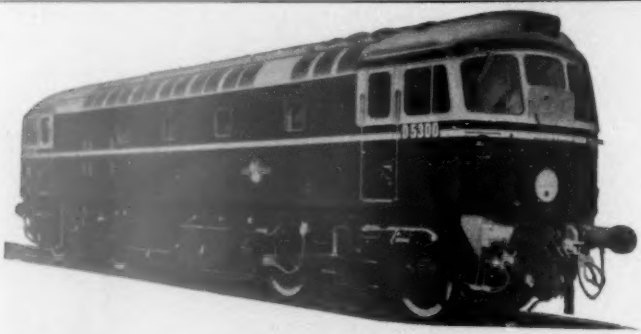
1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Derby, Crewe and Darlington works of the B.T.C.

176 of these locomotives are to be supplied with Sulzer Engines and Power Equipment by A.E.I. Traction Division.

Metcalfe-Oerlikon brakes are also fitted.





1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Birmingham Railway Company & Wagon Co. Limited.

47 of these locomotives have Sulzer Engines and Crompton Parkinson Power Equipment.

Metcalfe-Oerlikon brakes are also fitted.

1100 H.P. Type '2' Diesel-Electric Locomotives.

Built by the North British Locomotive Company Ltd.

They have N.B.L./M.A.N. Diesel Engines and General Electric Company Power Equipment.

Metcalfe-Oerlikon brakes are also fitted to **38** of these.

The above are just three of the many types of Main Line Diesel-Electric Locomotives now in service with British Railways and all are equipped with 'Metcalfe-Oerlikon' patent Vacuum Controlled Air Brake Equipment.

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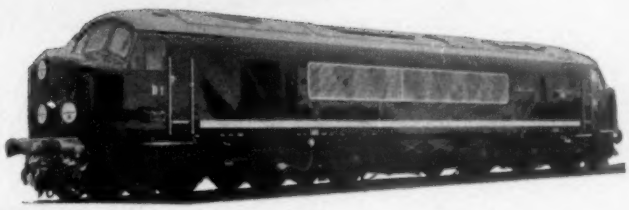
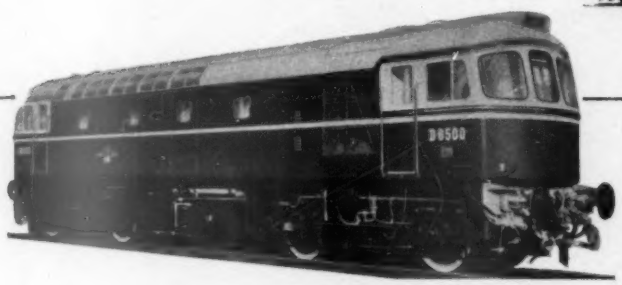
MODERN BRAKE EQUIPMENT

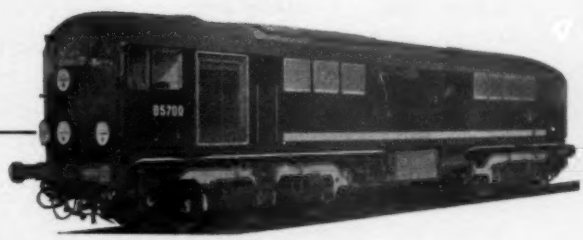
10 – 2300 H.P. Type '4' Diesel-Electric Locomotives. Built by the Derby Works of the B.T.C. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. 10 of these Locomotives are in service with British Railways and a further **137** are now building.

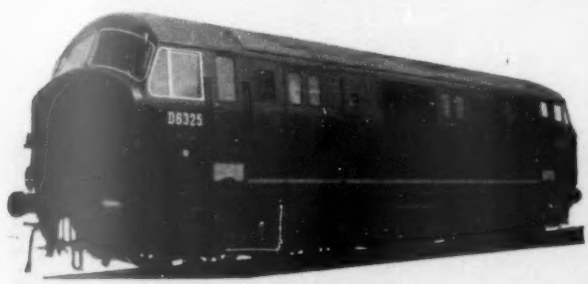




1550 H.P. Type '3' Diesel-Electric Locomotives. Built by the Birmingham Railway Carriage & Wagon Co., Ltd. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. **98** of these Locomotives are to be supplied, and these are arranged for working with either 'Vacuum' or 'Air' braked trains through a single Driver's Brake Valve.

20 – 1200 H.P. Type '2' Diesel-Electric Locomotives. Built by Associated Electrical Industries Ltd. and fitted with Crossley Brothers Ltd. engines. These Locomotives are now in service on British Railways.





52 – 1100 H.P. Type '2' Diesel-Hydraulic Locomotives being built by the North British Locomotive Co., Ltd. with N.B.L./M.A.N. Engines and Voith/North British Hydraulic Transmission.

THE ABOVE LOCOMOTIVES ARE EQUIPPED WITH METCALFE-OERLIKON BRAKE EQUIPMENT

JUST ANOTHER FOUR OF THE MANY TYPES OF MODERN MAIN LINE LOCOMOTIVES NOW IN SERVICE WITH BRITISH RAILWAYS. ALL ARE EQUIPPED WITH METCALFE-OERLIKON MODERN BRAKE EQUIPMENT

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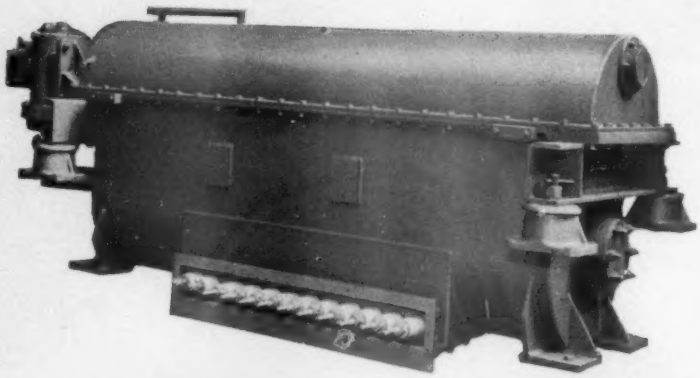
The multi-unit motor coach illustrated is one of a group of 71 such units built at York and Doncaster with electrical equipment by the General Electric Company Ltd.

The G.E.C. 1,000 kVA transformer and two reactors (as shown here) are carried on Silentbloc anti-vibration mountings. These motor coaches provide the power for 3 or 4 coach multiple-unit trains on the Eastern Region Suburban lines.



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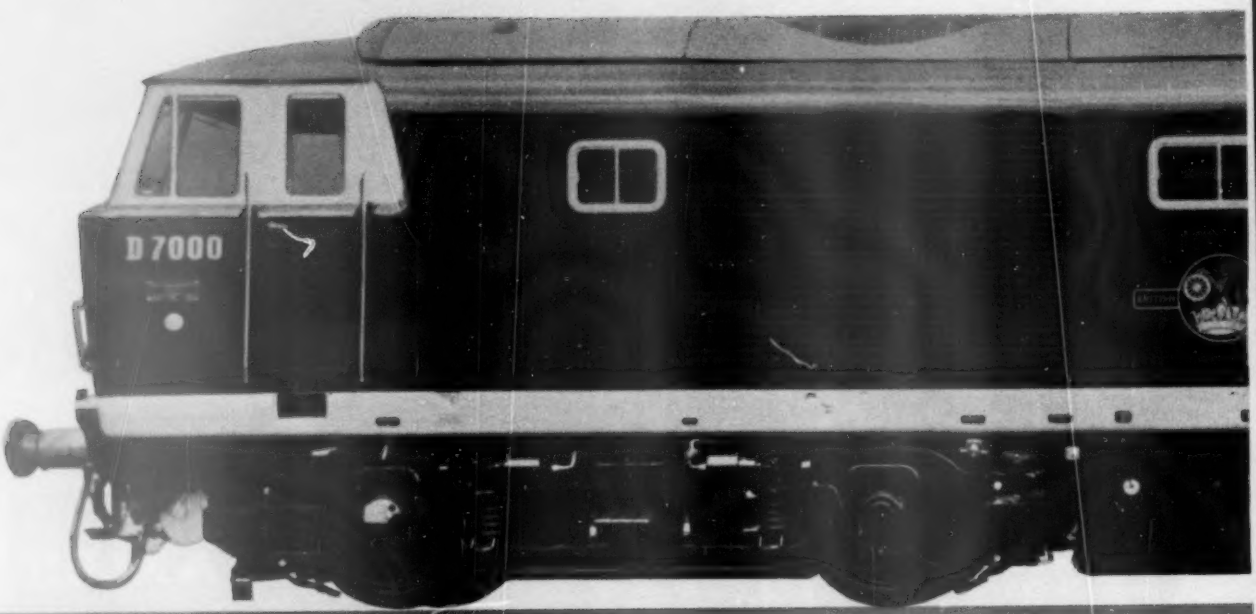

HYMEK

DIESEL-HYDRAULIC LOCOMOTIVES

TECHNICAL DATA

Wheel arrangement	B-B
Wheel Diameter	3 ft. 9 in.
Horsepower	1,700
Max. axle load	18·5 tons
Total weight	74 tons
Fuel capacity	800 gallons
Engine	Bristol Siddeley Maybach MD 870
Transmission Box	Stone-Maybach "Mekydro" K184U
Axledrive gearboxes	Stone-Maybach C33V and 33
Starting T.E.	49.700 lb. (30% adh.)
Continuous T.E.	33,950 lb.
Max. service speed	90 m.p.h.
Train heating	Stone-Vapor Boiler

DELIVERED BEFORE TIME

95 diesel-hydraulic locomotives are now going into service on the Western Region British Railways and the first was handed over officially on May 16th, 1961.

Contractual delivery date was July 31st, 1961.

BEYER PEACOCK (HYMEK) LTD

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LOCOMOTIVE HOUSE, BUCKINGHAM GATE, LONDON, S.W.1

portable welding equipment

for continuous jointing of long welded rails

Developed for use with the system originated by British Railways, this lightweight plant comprises a welding generator, a profile grinding machine and a vertical milling machine. It can therefore carry out the entire process of welding in situ, dressing, profile grinding and milling in an average time of 30 minutes per pair of rail joints for two operators.

The welding generator, driven by a governed 25 h.p. air-cooled engine, provides 300A continuous, with a maximum of 400A. Engines can be supplied for running on petrol or propane gas. The auxiliary generator gives 27.3A at 110V d.c. for operating auxiliary equipment. The complete assembly is mounted in a wheeled tubular frame with all controls, the total weight being about 965 lb. A pair of tubular detachable handles is provided for manœuvring the unit on the site.

After the weld is made, excess metal is removed by a portable Flextol flexible shaft grinder. The Flextol Profile Grinder attachment is then clamped to the rail, and its flexible grinding belt gives a contour accurate within 0.005". The Vertical Milling Attachment then removes from the base of the rail the steel strip used to retain the weld metal.

Whilst primarily intended for jointing rails, the welding plant is equally suitable for other welding work where a high output is required from portable equipment.

Flextol POWER TOOLS

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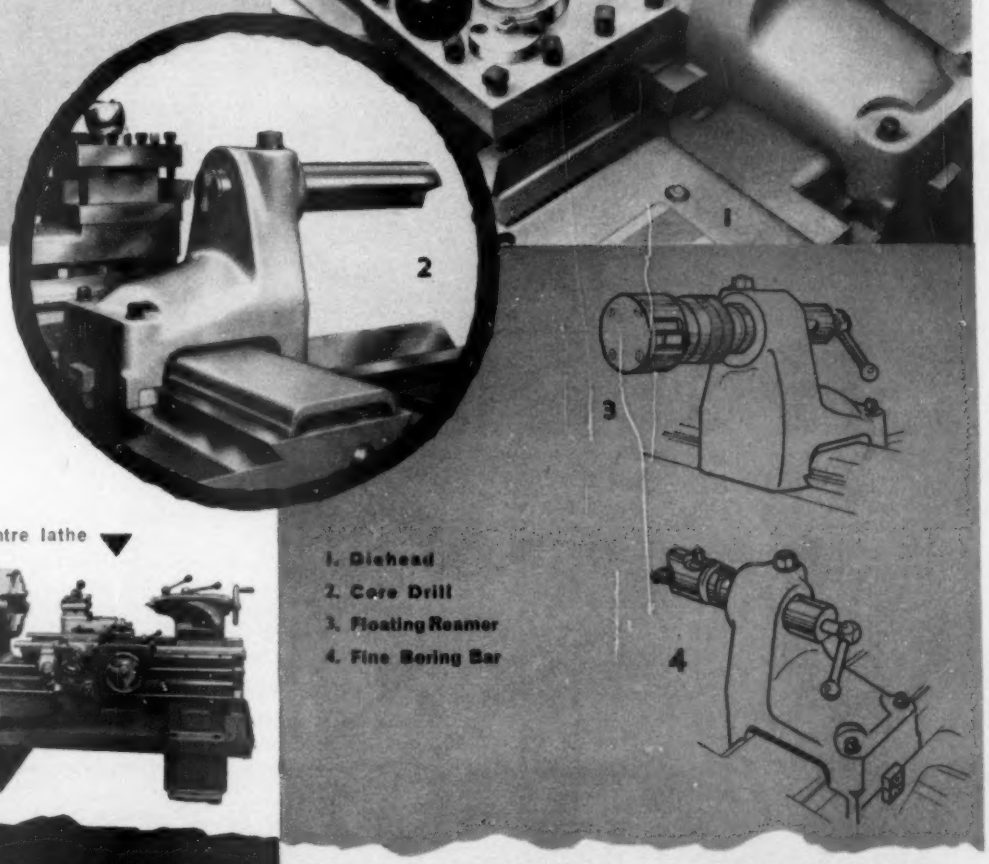
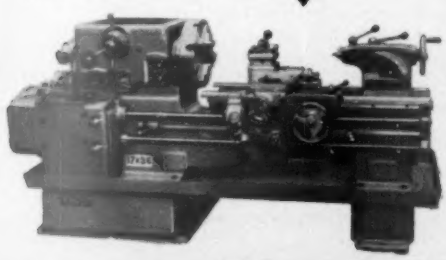
The power drilling attachment can be used for mounting drills, boring bars, reamers or dieheads and operations can be carried out using either hand traverse or power feed giving distinct advantages over the use of the Tailstock. Improved pitch accuracy is obtained when using the diehead with full leadscrew control.

A centre stop locates the attachment in line with the spindle and a quick acting clamp allows removal to the rear of the slide for normal turning. A hardened and ground morse taper sleeve is provided complete with Ejection screw.



1. Diehead
2. Core Drill
3. Floating Reamer
4. Fine Boring Bar

Type 17 inch centre lathe ▼



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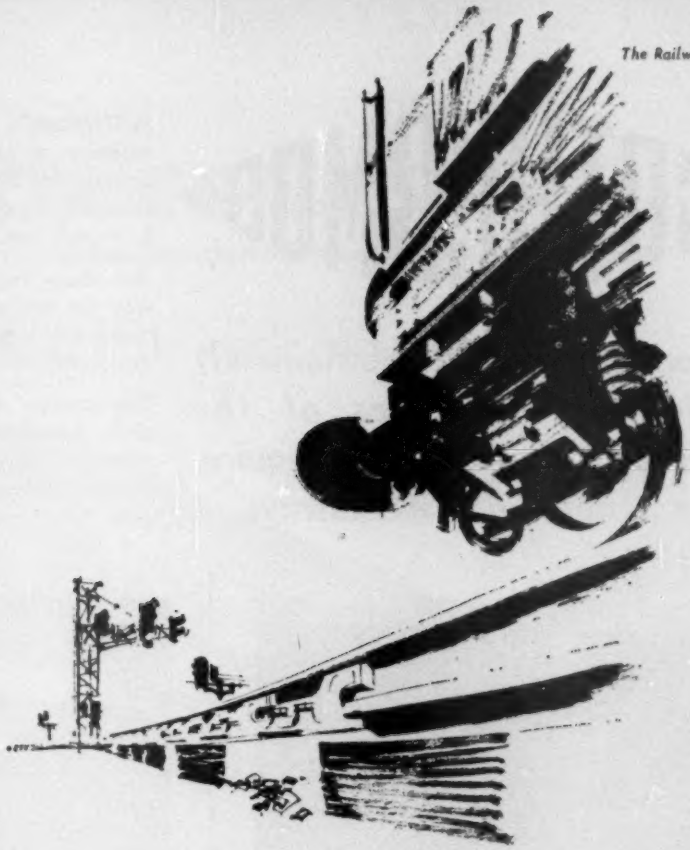
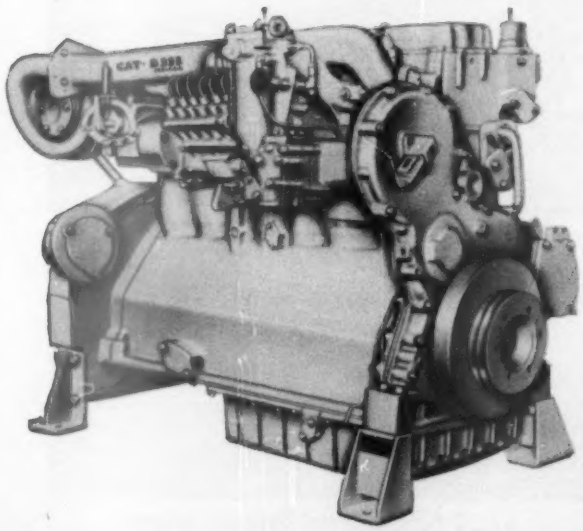


YOU'RE LOOKING AT CAT POWER!



Eleven job-tested models, all heavy duty engines. Compact, economical, lightweight and high in performance. They'll meet your industrial, marine and electric power application needs from 50 to 730 H.P.

These engines have abundant "Certified" power, eager to handle the tough jobs and ready to go when it comes to vital assignments. You've never known economy and long life if you haven't tried Caterpillar dependable engines.

Caterpillar power comes to you with the major cost-and-time saving advantages of service and complete interchangeability of parts—backed by the finest world-wide dealer organization.

For new equipment or for repowering, order Cat. No other name packs so much power.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co

World's Greatest Name in Diesel Power

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ISOTHERMOS

Isothermos modern mechanically lubricated axleboxes of the "Athermos" type meet all requirements of modern railways

ISOTHERMOS axleboxes are in the forefront of the technics of railway journal lubrication, having gained THE WORLD SPEED (205 m.p.h.) AND ENDURANCE (405,000 MILES) records when fitted to French National Railways Electric Locomotives.

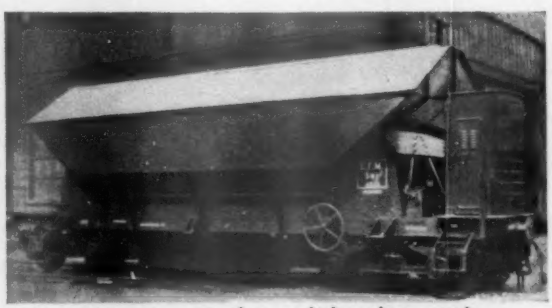
The above technical achievements have shown the way for Isothermos designs meeting the particular problem of modern railway wagons including special device for TIPPING PURPOSES.

Thousands of Isothermos axleboxes are in daily operation by the main European and African Railway Companies. They are incorporated in the modern wagons of their new development programmes.

Hellenic State Railways

10,000 Spanish State Railways 20-ton wagons

French National Railways, International Union of Railways standardised wagons



Moroccan Railways (Phosphate ore)

1,500 Danish State Railways wagons

5,000 Turkish State Railways wagons

SOCIÉTÉ INTERNATIONALE DES APPLICATIONS ISOTHERMOS

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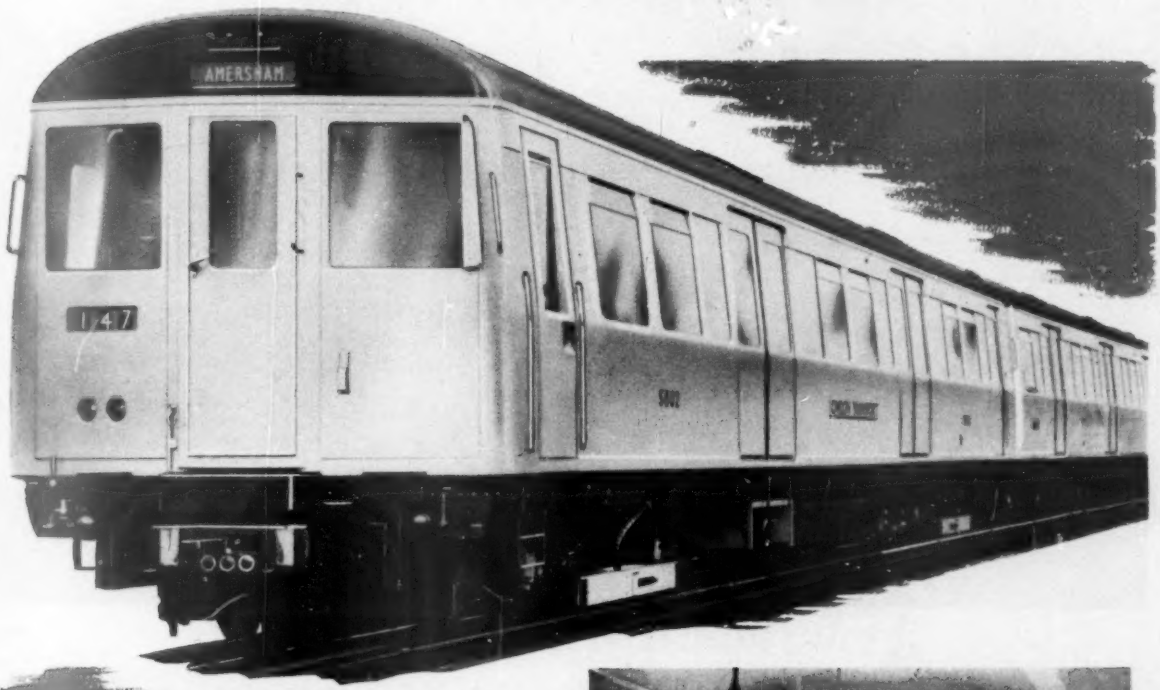
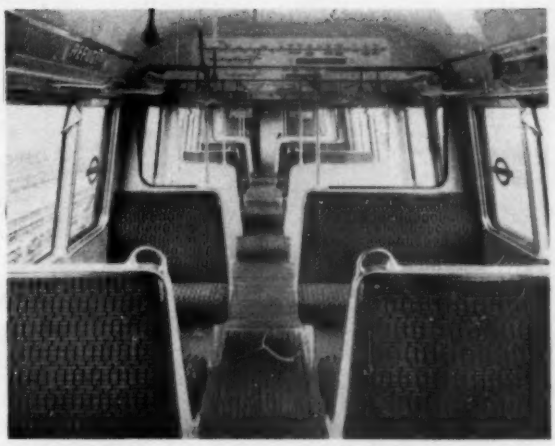
Exclusive Licensees in Great Britain: **F. H. LLOYD & CO. LTD.,** JAMES BRIDGE STEEL WORKS, Nr. WEDNESBURY, STAFFS., ENGLAND

LONDON TRANSPORT

LIGHT ALLOY ROLLING STOCK





464 Electric Coaches of light alloy construction for service on the Metropolitan Line of the London Transport Executive are now being built

by

GRAVENS LTD.

ARCHITECTS FOR PASSENGER AND FREIGHT STOCK

OF SHEFFIELD ENGLAND

176 PAXMAN FLAT DIESELS FOR BRITISH RAILWAYS

Features of the Paxman ZH diesel

1. Designed specifically for rail traction application.
2. Rugged, compact (only 30" high) with maximum accessibility which enables overhauls with engine in situ.
3. Full power developed with maximum rotational speed of 1500 r.p.m.
4. Full torque available over entire speed range.
5. Moderate piston speed.
6. Suitable for coupling to electric, hydraulic or fluid-mechanical transmissions.
7. Long periods between overhauls.
8. Backed by a world wide spares and service network.

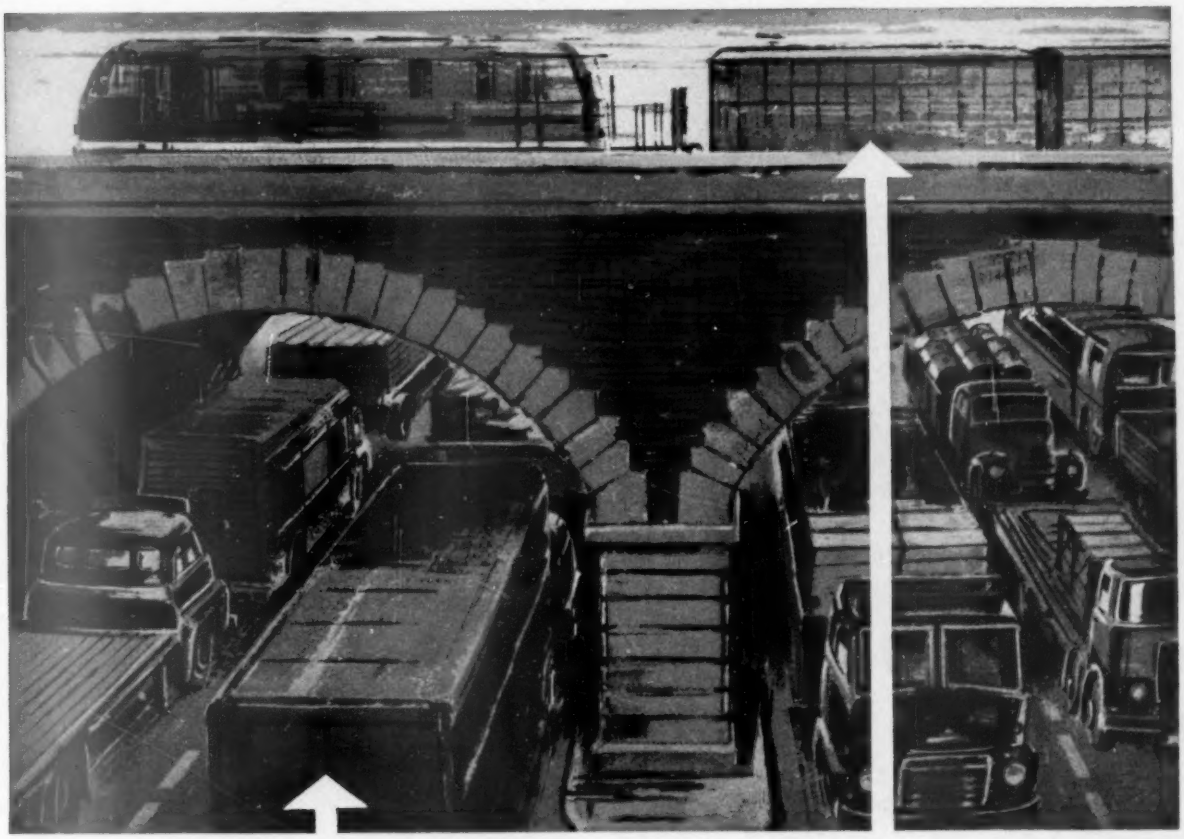
176 Paxman 6ZHXL 'flat' diesels have been ordered for British Railways' new Type 1 Locomotive.
These are the 6-cylinder pressure-charged, **450 b.h.p.** rail traction diesels from the famous Paxman 7" bore range . . . specifically designed for underfloor or deck mounting . . . for applications in mixed traffic locomotives, shunters and railcars.
Extensive endurance tests followed by successful proving trials on British Railways have established the Paxman 'ZHXL' as today's outstanding 'flat' rail traction diesel in this high power range.
Paxman already have a fine record in rail traction diesel progress. Watch it grow!

PAXMAN ***rail traction diesels***

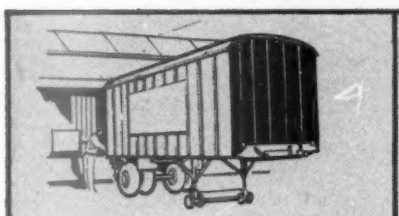
flat, vee-form and vertical—with powers from 130 to 3200 b.h.p.

DAVEY, PAXMAN & CO. LTD · COLCHESTER · ENGLAND a member of the BUSTON Group

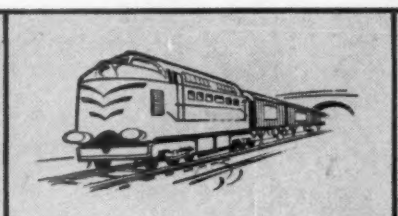
P.R.9.



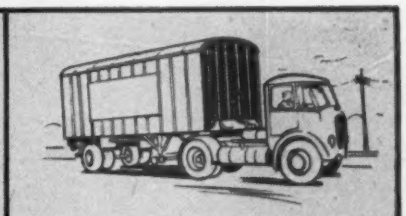
This lorry... could be up there if only it were a Roadrailer!



1 The Roadrailer, loaded at the factory as an ordinary articulated lorry.



2 The Roadrailer as part of a fast freight train.



3 The Roadrailer converted back to a lorry completes delivery by road.

What have roads got that railways haven't? Door-to-door service on the same vehicle. They also have something else—traffic jams! These can make a potentially fast service into a frustratingly slow one.

The railway's fundamental equipment is the permanent way and on direct hauls it is the cheapest form of overland transport. To neglect its clear-cut advantages on long and medium trunk hauls does not make sense.

Now the Roadrailer gives the obvious answer. It is a road vehicle that is transferred on to the permanent way in 150 seconds by letting down rail wheels. It can be adapted for any traffic including liquids, timber, cement. It coddles its loads with a suspension so smooth that a threepenny bit has been made to stand on edge at 65 m.p.h.

Feed railheads by road; trunk between railheads by rail. That makes sense. And now the Roadrailer can achieve it as a practical, profitable proposition.

150 SECONDS — YOU CAN HAVE THE BEST OF BOTH WORLDS

PS

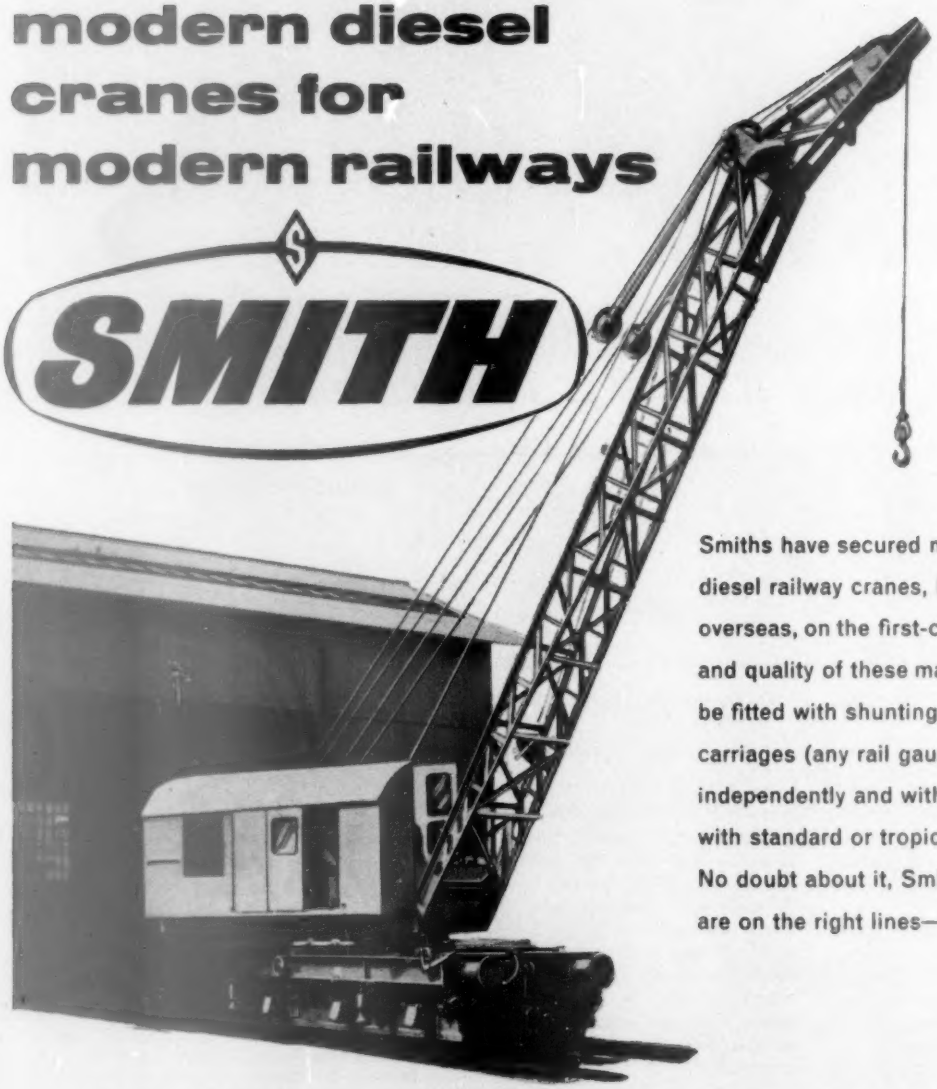
PRESSED STEEL CO. LTD.

Railway Division,
Linwood Factory, Paisley, Scotland

LONDON OFFICE: Railway Division, 47 Victoria St., London, S.W.1. HEAD OFFICE: Cowley, Oxford. BRUSSELS OFFICE: 2301/2307 Centre International Rogier, Passage International 6, Brussels 1, Belgium. Manufacturers of car bodies, Prestcold refrigeration equipment, all kinds of pressings and executive aircraft.

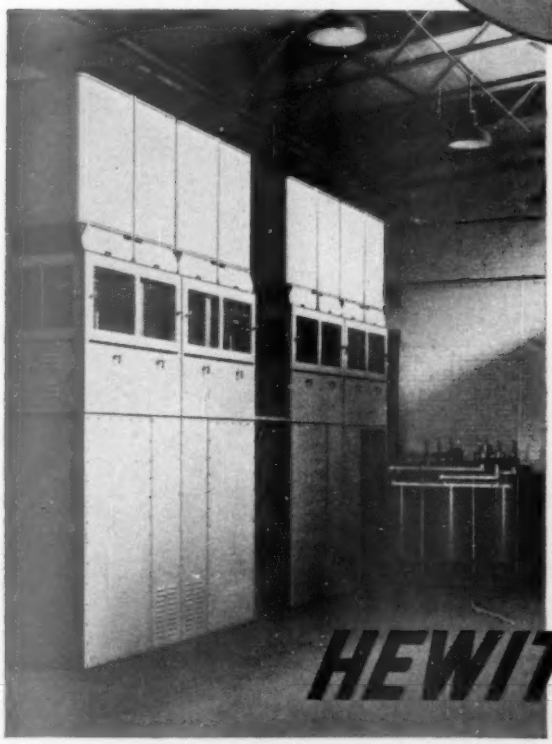
modern diesel cranes for modern railways

SMITH



Smiths have secured many contracts for diesel railway cranes, both in Britain and overseas, on the first-class design, efficiency and quality of these machines. They can be fitted with shunting or non-shunting carriages (any rail gauge), to travel independently and with rolling stock; and with standard or tropical cabs, as specified. No doubt about it, Smith railway cranes are on the right lines—all over the world!

THOMAS SMITH & SONS (RODLEY) LTD., RODLEY, LEEDS, ENGLAND



THE LARGEST SUBSTATION ON LONDON TRANSPORT RAILWAYS

The Hackbridge and Hewittic Electric Company is responsible for the supply of 9,000 kW of rectifier and enclosed air-blast-cooled transformer equipments together with associated A.C. and D.C. control gear at Charing Cross substation feeding the District, Bakerloo and Northern lines. This substation is designed for an ultimate capacity of 12,000 kW.

The photograph, left, shows two 1,500 kW equipments. One of the two main transformers in the farther set is withdrawn to show its location.

equipped exclusively with

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HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
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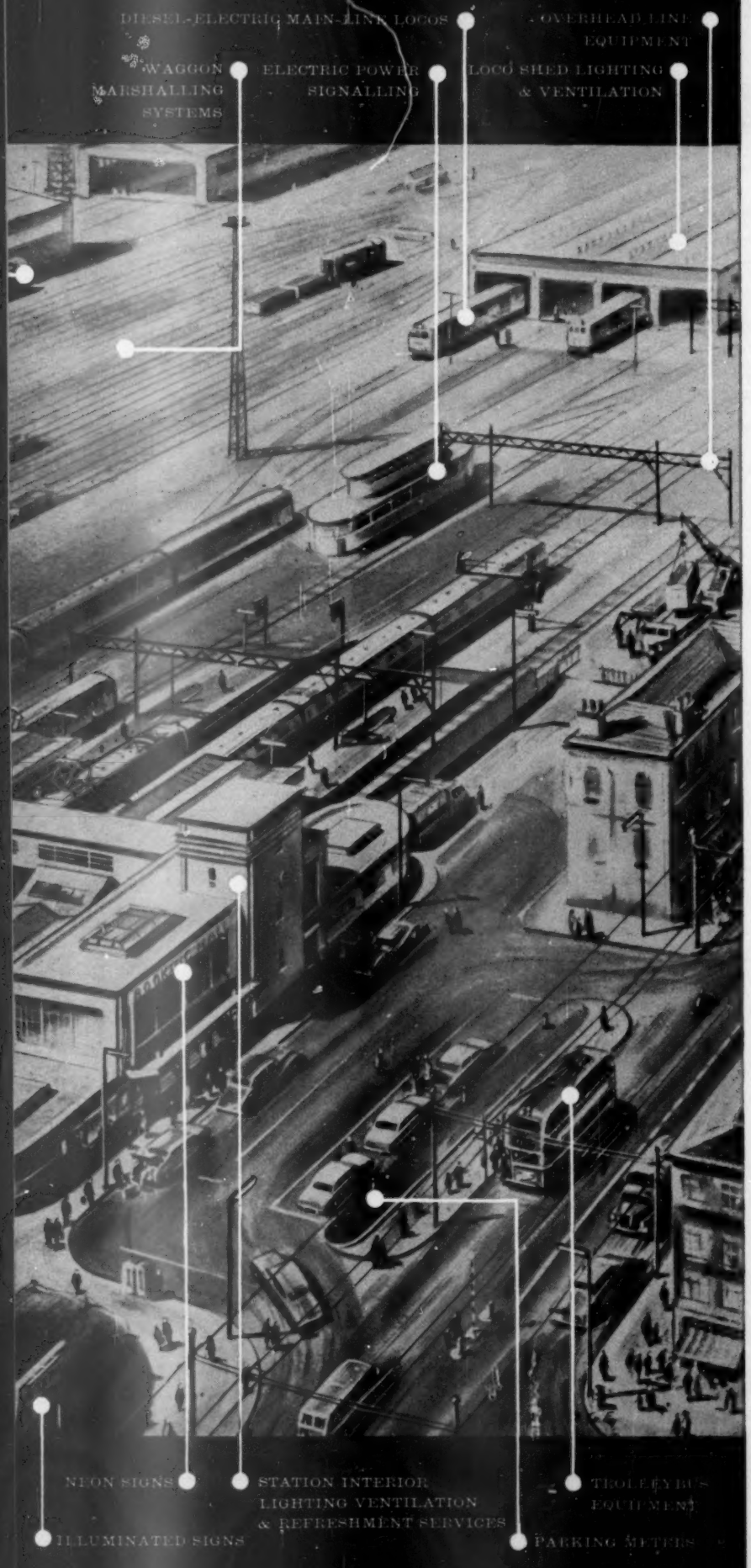
TELECOMMUNICATIONS
SUB-STATION EQUIPMENT
ROLLING STOCK CATERING EQUIPMENT
CARRIAGE LIGHTING & HEATING EQUIPMENT
LOUDSPEAKERS



the picture tells the story

G.E.C. designs, manufactures and installs equipment for the complete electrification of railway systems.

RELY ON THE EXPERIENCE OF

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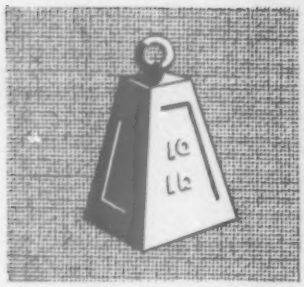
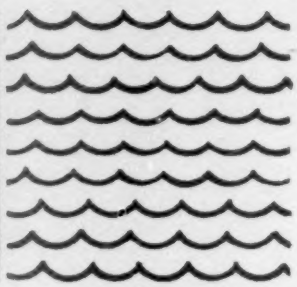
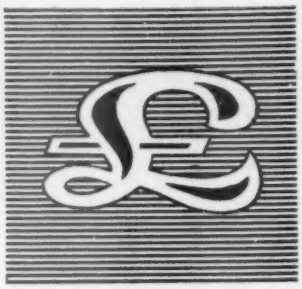
SAVE







weight · water · space · cost!

Neat, light and space-saving, Wild Lavatory Flushing Valves operate at maximum efficiency with the minimum use of water. The prescribed amount of water for flushing—it can vary from ¼ to 2 gallons—is strictly regulated and the valves will function satisfactorily down to a 3 ft. head of water.

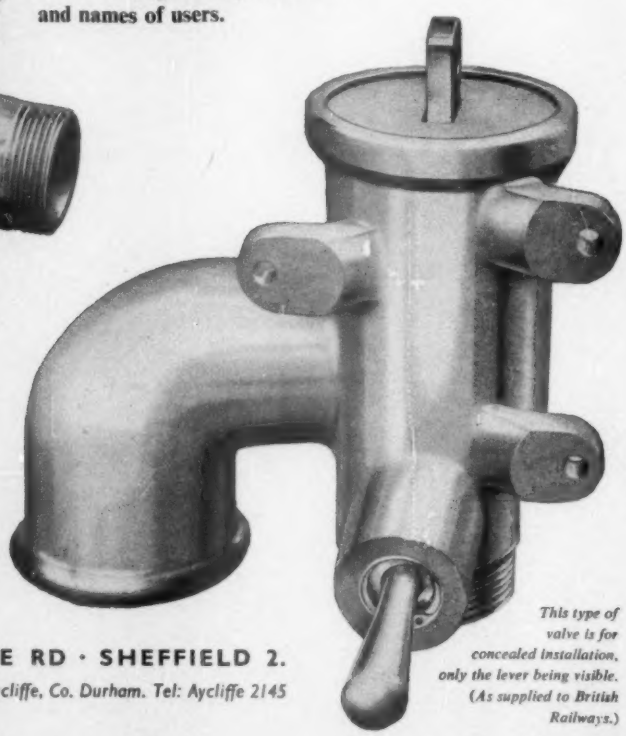
The trouble-free operation of these valves is determined by basically simple design, ensuring positive re-seating and instantaneous action. This same simplicity eliminates the need for small bye-passes so there is no risk of clogging.

Available with trip lever or push button control as illustrated.

Write for explanatory literature and names of users.

Mushroom relief valve with push button control.

Mushroom relief valve with trip lever control.



This type of valve is for concealed installation, only the lever being visible. (As supplied to British Railways.)

FLUSHING VALVES by

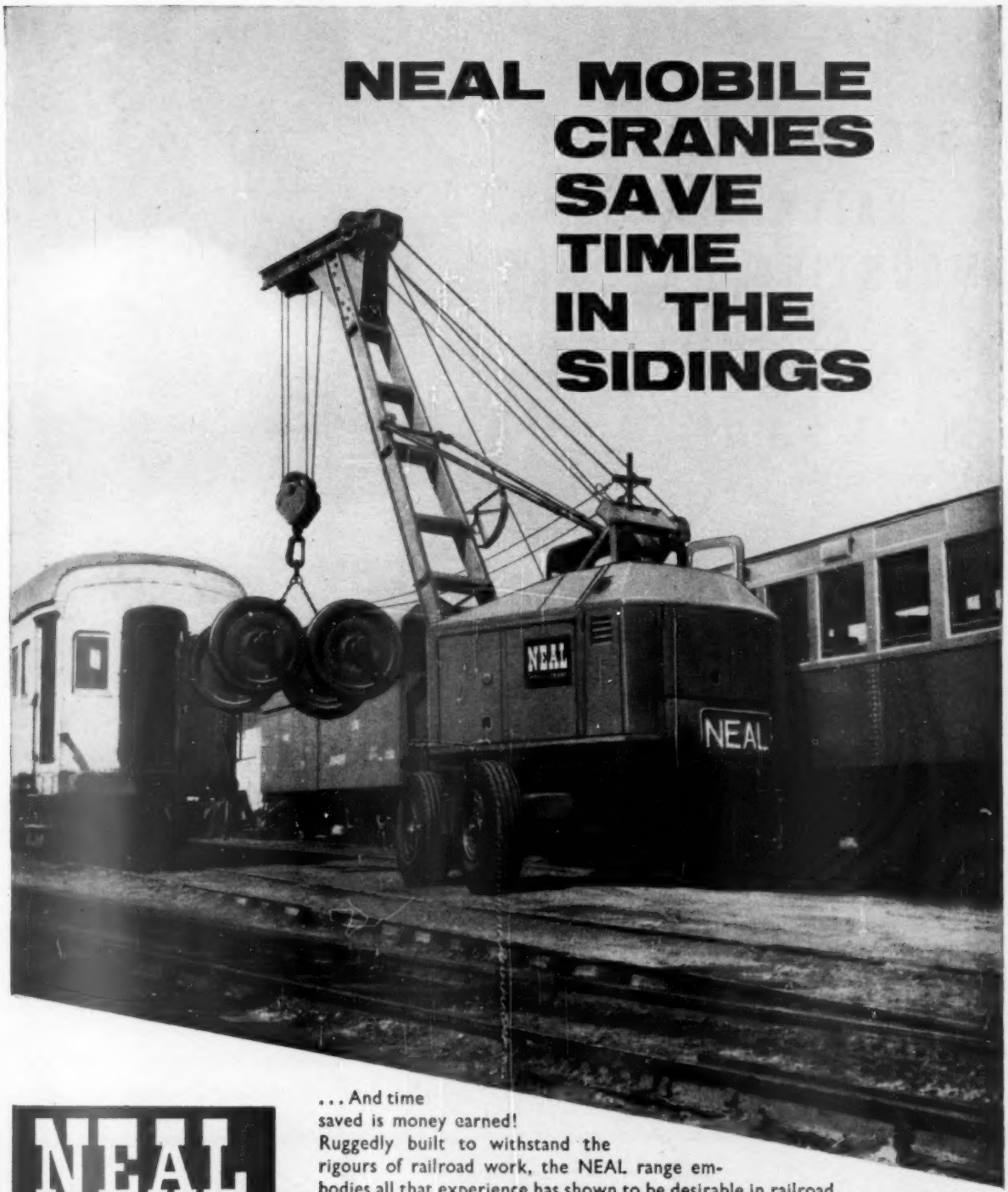
WILD

A. G. WILD & CO LTD · CHARLOTTE RD · SHEFFIELD 2.

and at Aycliffe Trading Estate, Aycliffe, Co. Durham. Tel: Aycliffe 2145

AW.145

NEAL MOBILE CRANES SAVE TIME IN THE SIDINGS



NEAL
MOBILE CRANES

. . . And time saved is money earned! Ruggedly built to withstand the rigours of railroad work, the NEAL range embodies all that experience has shown to be desirable in railroad cranes. Powerful diesel-mechanical drive . . . built-in safety devices . . . unlimited full circle slewing . . . and simple, independent controls which allow simultaneous operation of all crane motions under full engine power. Lifting cycles are quicker, and wagon turnround faster, with NEAL!

The name behind the best Cranes

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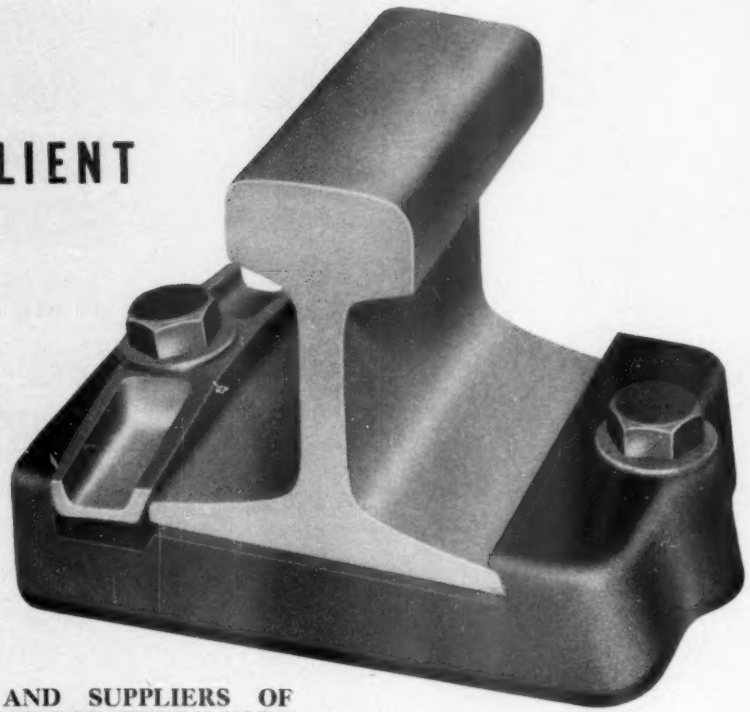
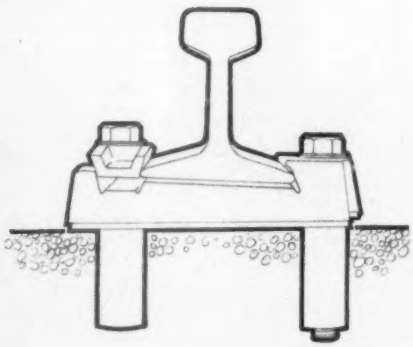
R.H.NEAL & CO.LTD.
HEAD SALES OFFICE: STEEL HOUSE, EASTCOTE, PINNER, MIDDLESEX.
SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER, LEEDS, NEWCASTLE, GLASGOW.

SEETRU RESILIENT RAILWAY MOUNTING SYSTEMS



SPECIALIST DESIGNERS AND SUPPLIERS OF RESILIENT RAIL MOUNTINGS FOR EVERY TYPE OF RAIL FOUNDATION.

(1) *Wooden Sleepers* (2) *Concrete Sleepers*
(3) *Steel Sleepers* (4) *Continuous Concrete Foundations*



Patented systems provide for complete electrical and mechanical insulation between rail and foundation by means of resilient grip rubber anchorages and rubber pads, together with positive creep-free location of rail. This system is also very suitable for long welded track.

Great economy in use of materials combined with robustness and reliability of components.

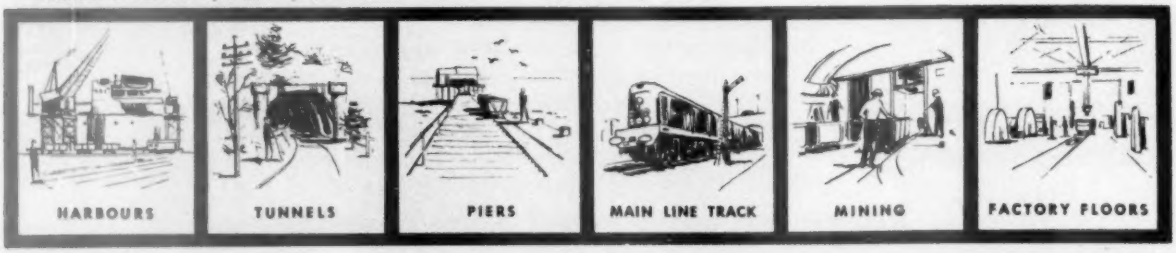
Outstanding ease of installation and maintenance. Resilient mounting protects both rail foundation and rolling stock.

In case of temporary lines mountings can be taken up and re-used. Special techniques available for laying track on continuous concrete foundations in tunnels, on harbour jetties, works yards, etc.

Special designs available for locomotive pits giving maximum operating width.

Designs undertaken for every type and size of rail and loading.

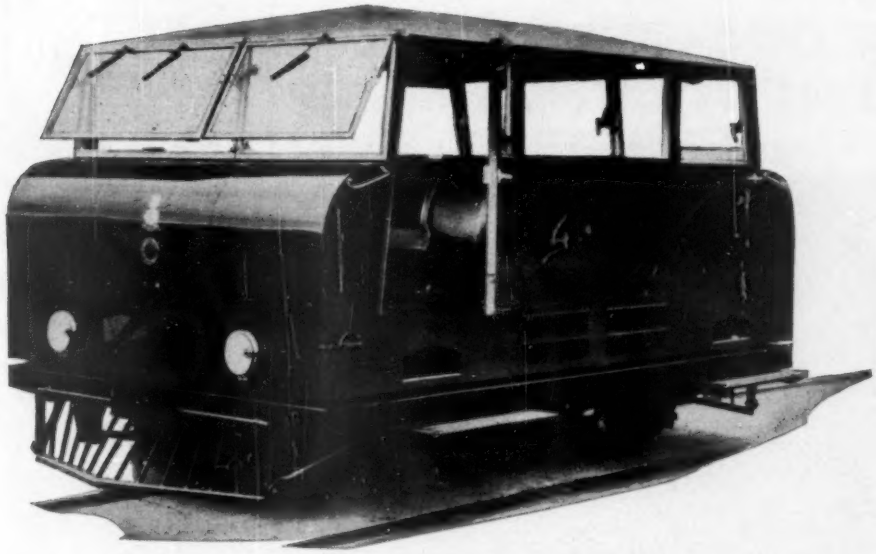
Contractors and Consultants to British and Overseas Railways, Harbour Boards, Mines, etc.



SEETRU LIMITED, 43 CORN STREET, BRISTOL 1

Telegrams: Seetru Bristol Telephone: 27242 · 26616

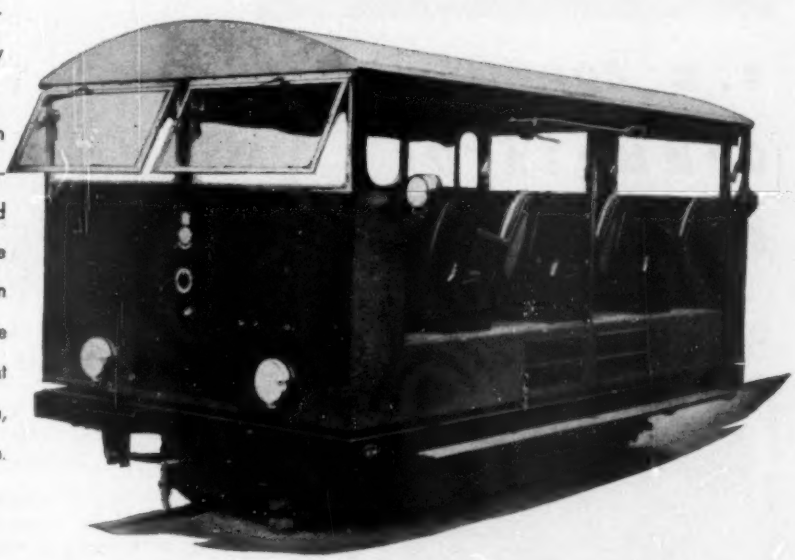
WICKHAM OF WARE



WICKHAM PRODUCTS:
DIESEL RAILCARS, LIGHTWEIGHT RAILBUSES, INSPECTION CARS, TOWER TROLLEYS, GANG CARS, PUMP TROLLEYS, TRACK EQUIPMENT.

The Wickham No. 40 Senior Official's Car has a world-wide reputation. Designed to supersede the expensive use of locomotive and coach, its economical and efficient operation makes it a notable contribution to railway economy.

The No. 40 Mk. II saloon and semi-open models illustrated embody the latest improvements — more space, better visibility and improved lighting. Seating nine and twelve respectively, on exceptionally comfortable foam rubber and leather upholstered reversible seats, these 85 b.h.p. cars have controls at both ends, and four speeds in either direction, from a crawl for close inspection to 60 m.p.h. (96 kms. p.h.).



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Tenacious and durable, hot galvanizing is still the most effective and most economical means of combating rust.

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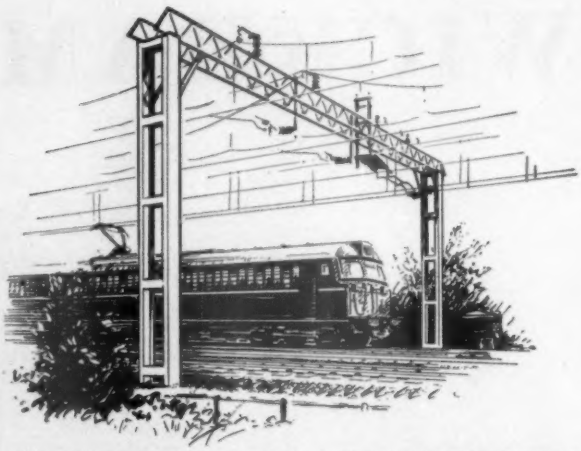
Gantries for B.R. Electrification Scheme. Fabricated by Redpath Brown & Co. Ltd. for B.I.C.C.

GI4



HOT-DIP GALVANIZING
by the 'Harco' Process

Harvey Products and Services include:

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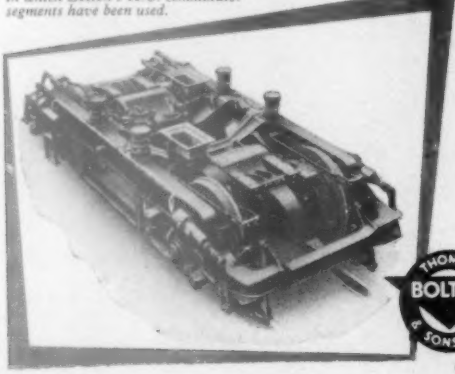
BOLTON'S

H. C. COPPER COMMUTATOR SEGMENTS

Illustration by kind permission of British Railways, and Associated Electrical Industries Limited (Traction Division)

View of bogie showing the two motors in which Bolton's H.C. commutator segments have been used.



CVS-564

USED BY ASSOCIATED ELECTRICAL INDUSTRIES LIMITED IN THE MANUFACTURE OF THE FIRST 25kV 50 CYCLE A.C. LOCOMOTIVE 3C00 SUPPLIED FOR SERVICE ON BRITISH RAILWAYS.

COMMUTATOR BARS AND SEGMENTS. All sizes and sections. Bars in random or exact (single and multiple) lengths. Segments sawn or stamped to shape. Stepped and other special sections. Double taper bars. Bars with radius on corners or on one or both edges.

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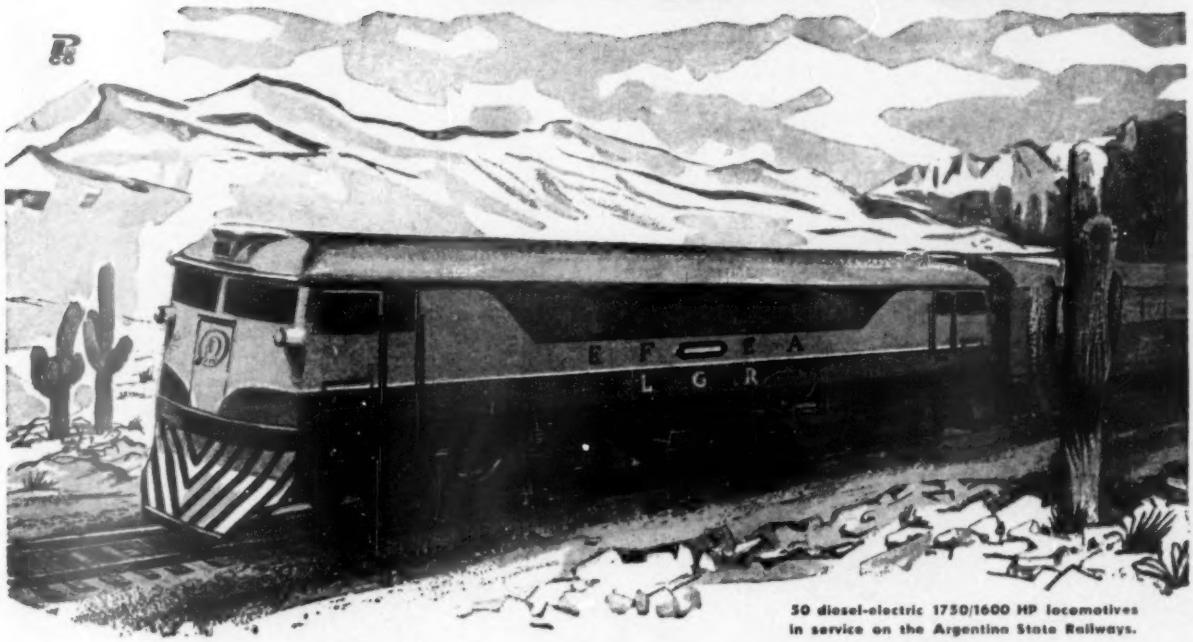
Cockerill-Ougrée contributes to the modernization of the railways in Argentina



50 diesel-electric 1750/1600 HP locomotives in service on the Argentine State Railways.

With its complete line of diesel-electric locomotives ranging from 600 to 2000 HP, built under licence from Baldwin-Lima-Hamilton Corporation, specially engineered for passenger and freight service, COCKERILL-OUGREE has within its wide programme the precise unit which will perform economically and reliably any specific job under any conditions of climate and terrain.

Cockerill-Ougrée has also specialised in the production of diesel-hydraulic locomotives ranging from 200 to 800 HP.

e 11/591

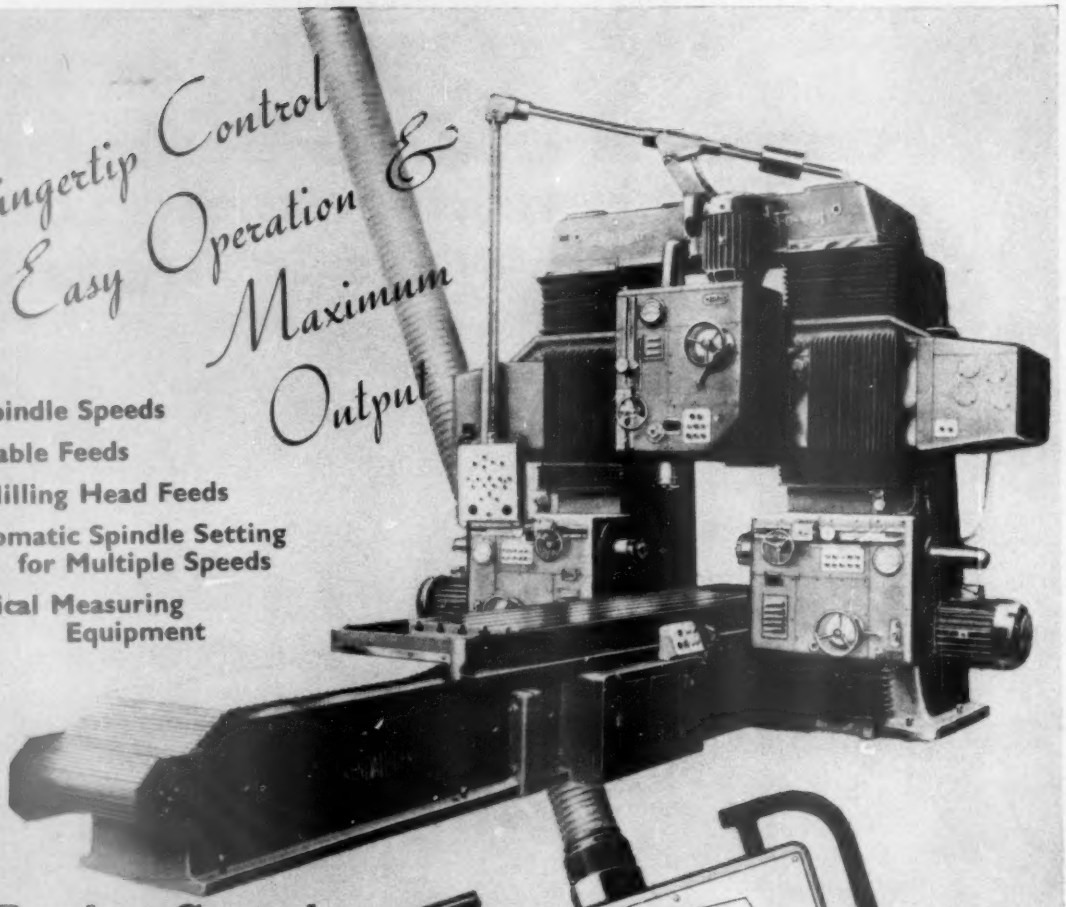
COCKERILL - OUGREE

SERAING (Belgium)

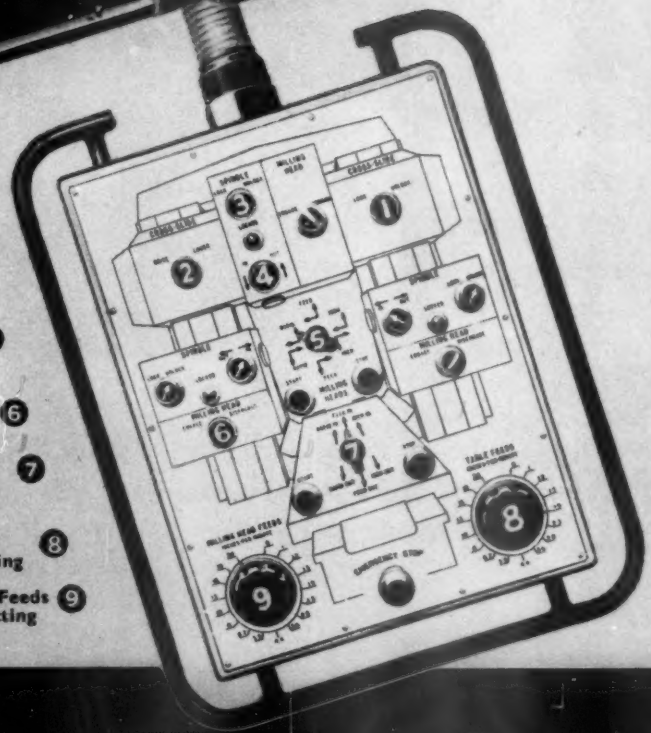
D*

Fingertip Control for Easy Operation & Maximum Output

16 Spindle Speeds
16 Table Feeds
16 Milling Head Feeds
Automatic Spindle Setting for Multiple Speeds
Optical Measuring Equipment



Pendant Controls



Cross-slide : Lock or Unlock 1
Cross-slide : Raise or Lower 2
Spindle : Lock or Unlock 3
Spindle Traverse : Down or Up 4
Milling Heads Traverse : Select Direction and whether Rapid Feed or Inch 5
Milling Head: Unclamp & Start or Stop & Clamp 6
Selector for Table Traverse : Select direction and whether Rapid, Feed or Inch 7
Selector for Table Feed : Adjustable even during cutting 8
Selector for Milling Head Feeds Adjustable even during cutting 9

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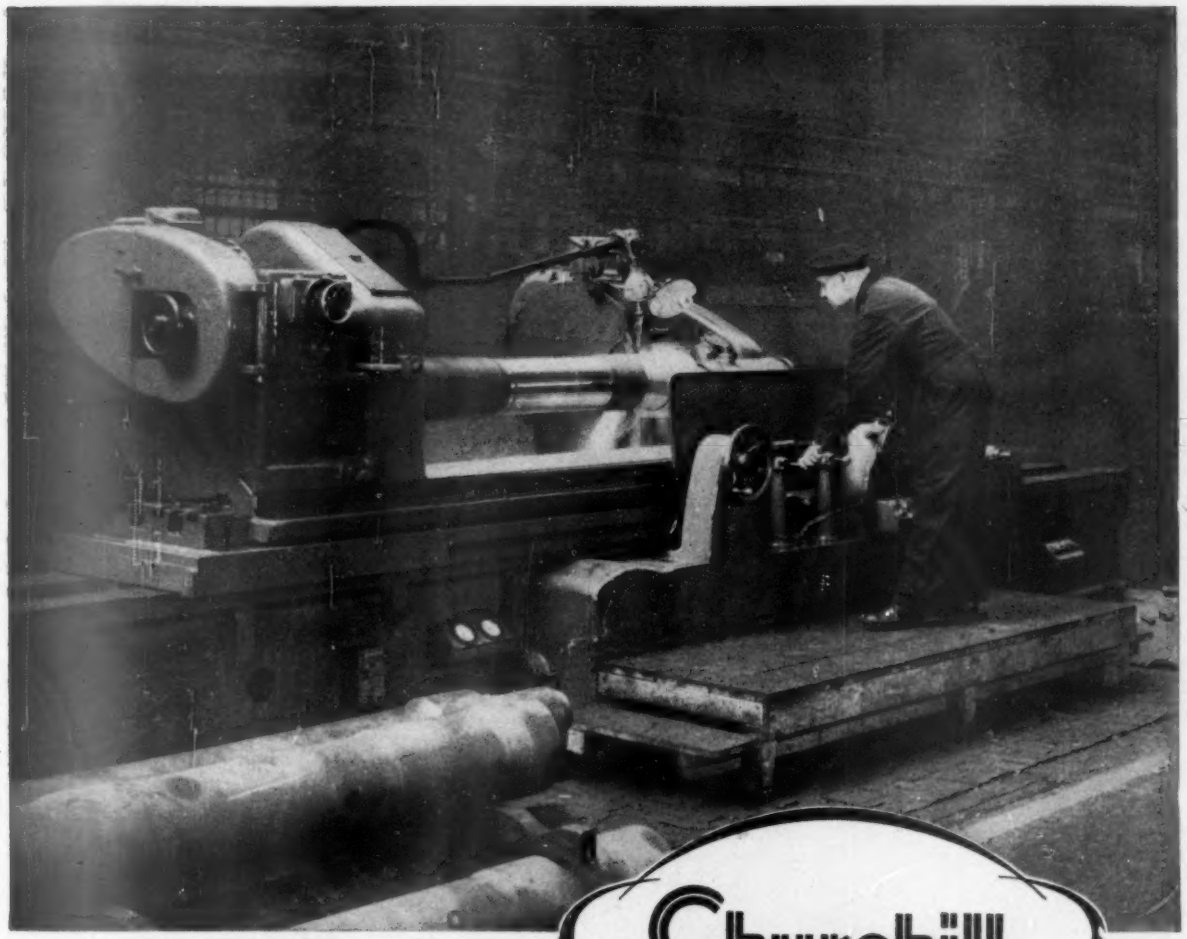

Churchill

Photograph by permission

The illustration shows a CHURCHILL Model 'F' 24 in. by 96 in. Heavy Plain Grinding Machine in operation at British Railways, London Midland Region, Crewe Loco Shops, grinding new locomotive axles. When you consider that these large machines are built to the same high degree of accuracy as the smallest CHURCHILL Tool Room Grinders you then have another reason for their pre-eminence in industry.

THE CHURCHILL MACHINE TOOL COMPANY LTD., BROADHEATH, MANCHESTER

Export Sales Organisation: Associated British Machine Tool Makers Ltd., London Branches and Agents.

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PRECISION *plus* PRODUCTION

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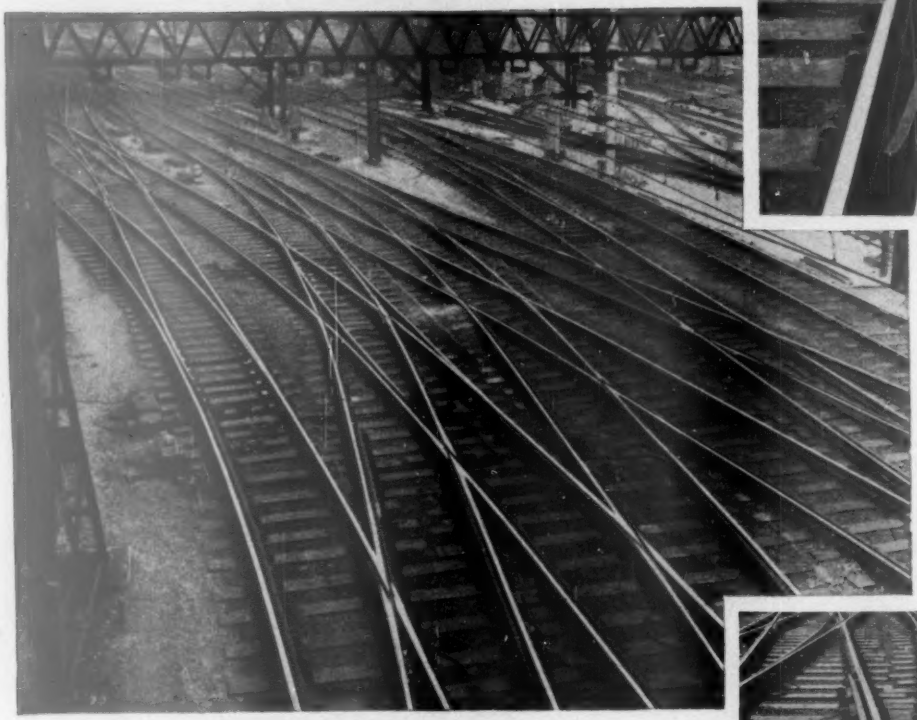
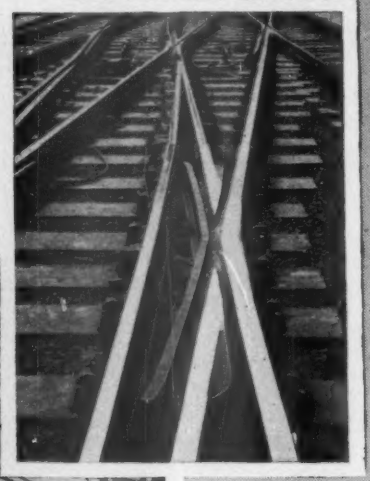
EDGAR ALLEN TRACKWORK at terminal stations in electrified areas



Cast manganese steel crossings at Liverpool Street Station.
Photographs by courtesy of British Railways, Eastern Region.



Obtuse cast manganese crossing

Common cast manganese crossing

With the introduction, by British Railways, of diesel and electric trains, greater wear takes place on the switches, crossings and closure rails. Manganese steel has been used at many of the leading terminal stations and has been found to stand up to the wear better than other steels. At Liverpool Street Station over 120 cast manganese steel crossings have been put in, together with rolled manganese steel switches and closure rails, in the running lines on both eastern and western sides of the station.

Edgar Allen & Co. Limited have also installed layouts in manganese steel in other terminal stations in London and Glasgow.

To find out more details of Imperial Manganese Steel Trackwork, why not fill in the request form.

EDGAR ALLEN & CO. LIMITED
IMPERIAL STEEL WORKS, SHEFFIELD 9

To EDGAR ALLEN & CO. LIMITED, SHEFFIELD, 9 T/114/RG.
Please send data on Trackwork to:

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POSITION.....

FIRM.....

ADDRESS.....

IMPERIAL

MANGANESE STEEL

The
RAILWAY GAZETTE

INCORPORATING: THE RAILWAY ENGINEER • TRANSPORT • THE RAILWAY NEWS • THE RAILWAY TIMES • RAILWAYS ILLUSTRATED
HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) • THE RAILWAY RECORD • THE RAILWAY OFFICIAL GAZETTE

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Railway catering

BEFORE the reorganisation of the railways under the very broad terms of the White Paper issued last December is implemented, one of the many problems which will have to be investigated with considerable care is that relating to railway catering. The problem has several sides. Catering is undoubtedly an amenity which the traveller has a reasonable right to expect on long-distance trains and at major interchange and other stations, and at the present time it is a good deal intermixed with special services. All that the White Paper has to say on the subject is that British Transport hotels will form the basis of a new company to be administered under the holding company which is to be set up by the Minister of Transport, but that railway catering services will be the responsibility of the Railways Board. This is a very broad outline on which to work, for the railway catering services as such include not only the various dining car, buffet car and similar facilities on trains, but also the special provisions made by the Pullman Car Company and the buffets and restaurants on stations. The restaurant cars and refreshment rooms so far have been administered by the British Transport Hotels & Catering Services under the board of management, of which Mr. F. G. Hole is Chairman & General Manager. The Pullman Car Company has its own arrangements as a separate entity under Sir John Elliot, as Chairman and Mr. F. D. M. Harding as Managing Director. The British Railways hotels are an important and profitable part of the Commission's undertaking. Obviously, considerable economies must accrue to the Commission, as a whole, by reason of the present integration of the services of this part of its organisation. To divorce the hotel side from the restaurant car and refreshment room activities is unlikely to improve the services or to make them more profitable.

New President for the "Locomotives"

MR. J. F. HARRISON, Chief Mechanical Engineer of the London Midland Region of British Railways, has been appropriately elected President of the Institution of Locomotive Engineers for the coming year. An indefatigable worker, he has achieved much during the past decade and has been largely responsible for the great developments which have taken place under modernisation on the mechanical side of British Railways. A railwayman since 1921, when he became a pupil at Doncaster Works, Mr. Harrison has gained his railway knowledge the practical way, passing through many grades before assuming the position of Mechanical & Electrical Engineer of the London Midland Region in 1951. Two years ago, in August, 1958, he assumed responsibility for the overall direction of mechanical and electrical engineering work of the Region, covering not only the mechanical and electrical but also the carriage and wagon departments and the technical aspects of those of motive power and road engineering.

Applied research in Industry

AT THE opening on June 20 of Alfred Herbert Limited's centre for machine tool research and development, Colonel C. W. Clark, Chairman of the company, stated that the centre marked the latest stage in a £2¼-million plan for expansion of his company's research facilities. Current expenditure on these activities was running at about £350,000 a year. On basic research, the company had very close association with the National Physical Laboratory, and a number of establishments supported by the Department of Scientific & Industrial Research. The President of the Board of Trade, Mr. Reginald Maudling, who opened the centre, said that, if Europe was merged into a single market, the wider opportunities for the machine tool industry would be considerable, notwithstanding increased competition. Our economic dependence on the processing of other nations' raw materials made essential the continued technical development and expansion of the British

machine tool industry. In this connection, Mr. Maudling emphasised the importance of small and medium-size companies supporting on a co-operative basis the newly-formed Machine Tool Research Association.

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total climb, including two other summit points on the route, of some 11,630 ft. during the day. Another of the trains, beginning at Zurich as the " Gottardo " and climbing over the Gotthard to Milan, will continue after 2 hr. 10 min. as the westbound " Cisalpin " finishing its 691-mile day with a run at 79·2 m.p.h. from Dijon to Paris. The third of these trains will content itself with the eastbound " Cisalpin " run from Paris to Milan, and the fourth will be spare for maintenance.

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Research headquarters at Derby

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In addition, the whole of the Department's resources in Derby will be brought into close touch in one locality, and day-to-day contact and collaboration between the engineering and chemical services will be much easier than it has been in the past. The use of mullions at 6-ft. intervals will provide a high degree of flexibility, as it will allow the sizes of the various laboratories to be varied by multiples of this spacing.

On the civil engineering side of the Research Department the main effort is being directed to overcoming track problems, such as the wear and failure of rails, and to anticipating the future effects of new forms of motive power, heavier freight vehicles, and higher speeds. Changes in the permanent way can only take effect over a period of years and research must start well in advance of future requirements. In the same way, many existing bridges were designed for very different conditions from those they are now having to meet, or may have to meet in the future, and considerable research is also being directed to this problem.

On the mechanical side, study is mainly directed to carriage and wagon subjects, such as improvements in the vacuum brakes of freight trains, the performance and interaction of brakes with different types of buffers and couplings, rail-wheel interaction problems, and the derailing tendencies of heavier wagons. Advice is also given to the mechanical engineering department on noise, heating, ventilation, corrosion and protective treatments. All these problems have assumed increasing importance in recent years, and have been the subjects of considerable research.

A lawless lot

MR. J. R. WHITBREAD'S book " The Railway Policeman," published on June 26 by Harraps at 18s., may not give a very clear idea of the British Transport Commission's police force, but it certainly provides hours of entertainment among a host of colourful, ingenious, unscrupulous, and some utterly horrible characters. It also goes far to demonstrate the English admiration and talent for the perpetration of crime—in support of this claim is the fact that Mr. Whitbread gives far more space to the misdoings of his crooked compatriots than to the derring-do of his subject-matter.

To misquote Bernard Shaw, this appears to be a case of " Those who can, do; those who can't, read (or write) all about it." Nevertheless, despite the fact that we still await a book on the workings, history, and, most important—personalities—of that fine body, the British Transport police, it should be known that Mr. Whitbread's contribution would make a welcome addition to the bookshelves of a far wider public than may be attracted by the bare claim of its title. Here the reader will learn of highly-paid navvies as tough as they come, fighting in gangs of Englishmen, Irishmen, and Scotsmen—the origins of all those stories ?—and investing their earnings in brightly-coloured plush waistcoats which were carefully removed before their owners indulged in strenuous activity, useful or otherwise; murder weapons clotted with gore; widening pools of blood; bodies in tunnels and trunks, under seats and in hampers; frantic females eluding the gentry along footboards of speeding expresses and screaming as they go; chivalrous thieves protecting the rights of former girl friends through outraged appeals to the police and, to cap all, an unlucky man (up to no good) who got himself packed and railed in a crate marked " This way up," but was turned by a porter " That way down " to howl his discomfort until released by a detective most cunningly hid in the same van and bent on his capture. Altogether, a most enjoyable 259 pages, well illustrated by 15 half-tone plates. An extract is given in this week's "Scrap Heap".

W.A.G.R. in 1959-60

THE year 1960 was one of achievement for the Western Australian Government Railways, writes Mr. C. G. C. Wayne, Commissioner for Railways, in his annual report, a copy of which he has sent us. Foremost was the handling of a record tonnage of goods and livestock; secondly, earnings reached their highest level ever, and thirdly and perhaps most significant of all, the increase in earnings was obtained with a relatively small rise in operating costs.

The table below gives comparative financial figures of the past two years:—

Details	1958-59	1959-60
	£	£
Earnings	13,699,803	15,038,264
Operating expenses	14,932,503	15,408,204
Operating loss	1,232,700	369,940
Depreciation and interest	3,814,372	4,026,751
Deficit	5,047,072	4,396,691

Vigorous efforts are being made to attract new business to rail and to win back traffic that has been lost to road transport. As the first phase of a comprehensive and critical examination of the Department's costs and services, a review is being undertaken of all passenger and goods services, both road and rail.

Capital investment at June 30, 1960 was £53,591,069, an increase of £1,972,440 on the previous year. The percentage of operating expenses to earnings was 102·46. Train-miles run were 7,961,880, an advance of 254,473. Both suburban and country passenger train-mileage decreased, but road passenger mileage went up, mainly because a number of passenger movements were taken over by road from rail services. Earnings per train-mile were 440·4d. (against 413·26d.), and operating expenses were 451·81d. (451·96d.).

Passenger-journeys totalled 14,139,954 (14,877,418), a de-

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In addition, the whole of the Department's resources in Derby will be brought into close touch in one locality, and day-to-day contact and collaboration between the engineering and chemical services will be much easier than it has been in the past. The use of mullions at 6-ft. intervals will provide a high degree of flexibility, as it will allow the sizes of the various laboratories to be varied by multiples of this spacing.

On the civil engineering side of the Research Department the main effort is being directed to overcoming track problems, such as the wear and failure of rails, and to anticipating the future effects of new forms of motive power, heavier freight vehicles, and higher speeds. Changes in the permanent way can only take effect over a period of years and research must start well in advance of future requirements. In the same way, many existing bridges were designed for very different conditions from those they are now having to meet, or may have to meet in the future, and considerable research is also being directed to this problem.

On the mechanical side, study is mainly directed to carriage and wagon subjects, such as improvements in the vacuum brakes of freight trains, the performance and interaction of brakes with different types of buffers and couplings, rail-wheel interaction problems, and the derailing tendencies of heavier wagons. Advice is also given to the mechanical engineering department on noise, heating, ventilation, corrosion and protective treatments. All these problems have assumed increasing importance in recent years, and have been the subjects of considerable research.

A lawless lot

MR. J. R. WHITBREAD'S book "The Railway Policeman," published on June 26 by Harraps at 18s., may not give a very clear idea of the British Transport Commission's police force, but it certainly provides hours of entertainment among a host of colourful, ingenious, unscrupulous, and some utterly horrible characters. It also goes far to demonstrate the English admiration and talent for the perpetration of crime—in support of this claim is the fact that Mr. Whitbread gives far more space to the misdoings of his crooked compatriots than to the derring-do of his subject-matter.

To misquote Bernard Shaw, this appears to be a case of "Those who can, do; those who can't, read (or write) all about it." Nevertheless, despite the fact that we still await a book on the workings, history, and, most important—personalities—of that fine body, the British Transport police, it should be known that Mr. Whitbread's contribution would make a welcome addition to the bookshelves of a far wider public than may be attracted by the bare claim of its title. Here the reader will learn of highly-paid navvies as tough as they come, fighting in gangs of Englishmen, Irishmen, and Scotsmen—the origins of all those stories ?—and investing their earnings in brightly-coloured plush waistcoats which were carefully removed before their owners indulged in strenuous activity, useful or otherwise; murder weapons clotted with gore; widening pools of blood; bodies in tunnels and trunks, under seats and in hampers; frantic females eluding the gentry along footboards of speeding expresses and screaming as they go; chivalrous thieves protecting the rights of former girl friends through outraged appeals to the police and, to cap all, an unlucky man (up to no good) who got himself packed and railed in a crate marked "This way up," but was turned by a porter "That way down" to howl his discomfort until released by a detective most cunningly hid in the same van and bent on his capture. Altogether, a most enjoyable 259 pages, well illustrated by 15 half-tone plates. An extract is given in this week's "Scrap Heap".

W.A.G.R. in 1959-60

THE year 1960 was one of achievement for the Western Australian Government Railways, writes Mr. C. G. C. Wayne, Commissioner for Railways, in his annual report, a copy of which he has sent us. Foremost was the handling of a record tonnage of goods and livestock; secondly, earnings reached their highest level ever, and thirdly and perhaps most significant of all, the increase in earnings was obtained with a relatively small rise in operating costs.

The table below gives comparative financial figures of the past two years:—

Details	1958-59	1959-60
	£	£
Earnings	13,699,803	15,038,264
Operating expenses	14,932,503	15,408,204
Operating loss	1,232,700	369,940
Depreciation and interest	3,814,372	4,026,751
Deficit	5,047,072	4,396,691

Vigorous efforts are being made to attract new business to rail and to win back traffic that has been lost to road transport. As the first phase of a comprehensive and critical examination of the Department's costs and services, a review is being undertaken of all passenger and goods services, both road and rail.

Capital investment at June 30, 1960 was £53,591,069, an increase of £1,972,440 on the previous year. The percentage of operating expenses to earnings was 102·46. Train-miles run were 7,961,880, an advance of 254,473. Both suburban and country passenger train-mileage decreased, but road passenger mileage went up, mainly because a number of passenger movements were taken over by road from rail services. Earnings per train-mile were 440·4d. (against 413·26d.), and operating expenses were 451·81d. (451·96d.).

Passenger-journeys totalled 14,139,954 (14,877,418), a de-

crease of 737,464. The passenger-revenue improvement of 5·19 per cent came mainly from suburban services. There was a small increase of £12,455 from country passengers, although the number carried declined. The higher total reflected longer journeys and a different basis of calculating the suburban portion.

The good seasons in Western Australia over the last two years were reflected in the 1959/60 haulage figures. Of the total tonnage carried, wheat provided 1,434,383 tons, almost 32 per cent, and 530,000 tons more than in the previous year. For the first time earnings exceeded £15 millions, and compared with the previous record of £14,044,111 in 1957 when two seasons' harvests were lifted.

Operating expenses, including depreciation, increased by £606,955 in relation to a £1,338,461 gain in revenue. This already good result would have been appreciably better had not basic wage and labour award variations required £511,000 more. Excluding this, the "real" cost of earning the extra revenue was less than £96,000, which meant that every additional £1 came in for a cost to the railway in additional effort of 1s. 5d.

Of the higher goods tonnage, over half came from wheat. Fertilisers showed an all per cent advance, and livestock 9·55 per cent. A good deal of livestock traffic has been recovered, in part because of improved facilities and faster transits. Total ton-mileage went up no less than 72,961,568 to 705,245,196.

The average haul for all traffic fell 5·99 miles to 155·59 miles, total earnings for goods traffic being £1,188,754 more at £12,445,225. Earnings per ton-mile were slightly lower at 4·17d., against 4·2d.

The average number of miles open was three more at 4,120. The average staff employed was 13,081 (13,240). The mean population of the State was 13,000 up at 725,000.

Just before the year ended the first of two new 1,425-h.p. diesel-electric locomotives was placed in service, and a second was due to follow shortly. In all respects, comments Mr. Wayne, 1960 was a year of progress, "but the next year should be even better." With increased operational efficiency and cost reduction gaining momentum, and with the assurance of a good wheat and grain harvest, the trend toward better financial results so evident in 1960 should continue.

The Argentine railway situation

IN a vigorous speech to the nation from Government House on June 5, President Frondizi announced that it had been decided to take stern, effective, and immediate measures to end without delay the "shameful situation of the railways." These measures, outlined in our June 9 issue, are encountering strong resistance from all quarters, and especially from the unions which object principally to the dismissal or transfer of men, and to the handing-over of ancillary services to private interests. Their views have been made plain in interviews held with the Minister of Public Works & Services and President Frondizi.

The provincial Governments are protesting against the closure of non-productive branches, and the Government of the province of Santiago del Estero has stated that it is intended to keep open the branches connecting Añatuya, Bandera, and Los Juríes by the renting of the track and installations to the province and the formation of a mixed entity to operate them, formed by the users of the line. Locomotives and rolling-stock would be rented by the State Railways, which would keep the lines functioning for a period of 60 days while the new basis of operation was then worked out. If the venture proves successful, it is likely to be imitated by other provincial Governments.

The World Bank Mission has recommended the closure of the following additional branches on the Roca Railway: Dorrego to Defferrari, Toay to Hucal, Ing. Jacobacci to Esquel and Puerto Madryn to Alto Las Plumas; on the Sarmiento Railway; Realicó to Bowen; on the Urquiza Railway, La Paz to San Juan, and on the Belgrano Railway, Zuviría to Alemanía.

Pressure is being put on the Government to suspend the application of the intended measure until the joint committee on which the men's representatives sit have produced their reports and recommendations. Meanwhile, notices have been posted in the stations announcing the closure of the first group of non-productive branches.

A nation-wide propaganda campaign making use of newspapers, magazines, radio and television has been organised to enlist public support for the Government's proposed action, one of the main arguments being that every inhabitant contributes 1,000 pesos per annum towards the railway deficit.

As a preliminary mark of protest and disapproval, the Union Ferroviaria has declared a 24-hr. strike at a date to be fixed later. Support from other unions has been requested.

Acts of violence by irate passengers are becoming the order of the day, especially on the Sarmiento and Belgrano Railways. The most serious of these took place on the latter line at Tapiales and Querandíes Stations, when a mob of more than 1,000 people set fire to two trains (which were burned out), wrecked the station buildings, and assaulted the employées, forcing them to seek safety elsewhere. Shots were fired and a youth was seriously injured.

The Norfolk & Western Railway

BY A CORRESPONDENT

EIGHTY years ago Roanoke was a secluded hamlet in Virginia, about 260 miles from the Atlantic coast. Now it is the headquarters of the Norfolk & Western, one of the busiest railways in America. The cover of its 1960 report shows an imposing block of offices there, as a background to some of the lines which carried last year 61 million tons of coal and about 18 million tons of merchandise. Until December, 1959, the N. & W., operating 2,138 miles of road and the Virginian railway, working 608 miles, had separate facilities at Roanoke and at Tidewater. Then the N. & W. absorbed its competition and improved freight movement by adjusting running lines, yards, and shipping places.

On the basis of combined statistics for the two railways, the first report for the new system of 2,744 miles states that freight trains, with higher average load and speed, produced 89,564 gross ton-miles in a train hour. That was an advance of 2 per cent on the 1959 output and a record. Running trains eastward over easy Virginian grades saved helper locomotives and lowered working costs. Transit times from the mines to the port of Norfolk were cut by as much as 24 hr.; this was made possible by the average length of haul for freight being 280 miles.

The N. & W. Board called 1960 a year of progress. Net income rose from $60·7 to $61·1 million. A record of $8·15 was earned on a share of common stock and a dividend of of $5 was paid on it. The operating ratio of 61·1 per cent was reduced to the astonishing figure of $59·7, against a ratio for all U.S.A. railroads of 79·5 per cent. No other railroad approached the N. & W. net railway operating income of $66,497,000.

Over the years this compact railway was prudently managed and is in the happy position of being the largest originator of bituminous coal in the United States. Last year, mines served by the N. & W. produced 58 million tons—14 per cent of total production—and it carried 3 million more tons loaded on other railways. N. & W. coal movement through Norfolk for overseas and coastwise shipment increased 4·5 per cent last year and accounted for 60·5 per cent of all coal shipped at Hampton Roads. Plans for a new coal pier costing $19 million, with a peak capacity of 8,000 tons per hr., will enable the railway to load the largest colliers afloat when it is completed within two years time.

Apart from coal, the N. & W. increased its export and coast-

wise traffic, making Norfolk the leading grain port on the Atlantic seaboard by shipping fully 66 million bushels of grain. In consultation with the Virginia Ports State Authority, the N. & W. is planning to provide facilities which should aid the Port of Norfolk to compete for a larger share of general traffic.

Seven years ago, the N. & W. had a fleet of powerful steam locomotives and used to circulate photographs of these coal-fired engines hauling heavy loads, generally by night, over stiff grades. In 1955, the board decided to adopt diesel traction and completed the change from steam power early last year, when it took delivery of 16 diesel-electric locomotives, costing $3·1 million. The N. & W. now relies on 529 diesels, which it considers " the most modern power fleet in the rail industry." It still retains 17 electric locomotives to work the 136 mile electrified section of the Virginian between Roanoke and Mullens away to the west.

Coal roads in the States strive to supply sufficient wagons to the mines to avoid any loss of output. Last year the N. & W. acquired 2,556 new wagons at a cost of $24·7 million. The bulk of the wagons were hoppers. As an experiment, the N. & W. built 709 coal hoppers of 85 ton capacity in its own shops at Roanoke. These are the largest wagons in use and the first to be equipped with roller bearings. They cost $8·5 million and are part of an order for 1,000 wagons of the same type. The total wagon stock was 78,988 last year compared with 81,750 in 1958, but the average capacity is likely to be higher and the turn-round time should be shorter.

The company paid cash for all 1960 capital outlays, amounting to $41·6 million and at the end of the year had on hand $78 million in cash and temporary investments.

This strong financial position no doubt encouraged the board to propose the expansion of the N. & W. into a 7,400-mile system by a merger with the " Nickel Plate " and lease and ultimate merger with the Wabash, together with the purchase of the Pennsylvania's Sandushy branch as a connecting link. The scheme would give the N. & W. access to the Great Lakes and Midwest areas and the board urges that it would increase traffic, provide an efficient service and stabilise employment. The Interstate Commerce Commission will have to consider so many objections to the mergers that an early decision is not to be expected.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

W.D. LOCOMOTIVES

June 20

SIR, I would like to make comment on a paragraph which appeared on page 587 of *The Railway Gazette* of May 26, 1961, under the heading " spotters." The facts appear to be incorrect.

As far as I am aware there is nothing secret about War Department locomotives. As the article itself infers, they are there for all to see who care to stand and watch out for them working at the various depots throughout the U.K.

Yours faithfully,

W. T. CALVERT
Colonel E4 (Tn) R.E.

The War Office,
London, S.W.1

EXPRESSES TO THE ORIENT

June 21

SIR, The passing of the " Orient Express " has occasioned some comment in the popular press, some of it obviously confused with the " Simplon–Orient." I travelled throughout recently on the " Tauern Express " (Ostend to Istanbul) and previously by the " Orient " as far as Budapest and the " Simplon–Orient " to Belgrade.

It is not altogether surprising that the " Orient " has gone; beyond Vienna the only passengers likely to use the through sleeping cars were those for Bucharest, surely very few; Budapest was reached before nightfall. From Budapest to Bucharest there are alternative (and cheaper) sleeping cars owned by the eastern administrations. The " Tauern " and " Simplon Orient " trains suffer in the same way, but there are more through journeys from the West to Istanbul or Athens. The original final destination of the " Orient " was Constanta where the frequent boat services of 60 years ago are now reduced to one a fortnight; Prague and Warsaw were not then in the itinerary, and there are alternative services now.

New life could be brought to these cross-European trains by approach on the lines of the " Trans-European Express," suitably modified to permit night travel. I would suggest morning departure from the Hook, Brussels, or Paris (allowing night travel from London by the " Hook Continental " or " Night Ferry "), which should give time to arrive at the Yugoslav frontier in the late evening, and in Belgrade at 6.30 a.m. Office hours in this capital begin at 7 a.m. Further east the aim should be to pass out of Bulgaria at Svilengrad about 10 p.m. leaving the run of 200 miles to Istanbul to be accomplished on the second night. This arrangement would allow maximum use of the seating capacity of the train on the day sections (Western Europe and Belgrade–Sofia).

At night passengers could have the alternative of reclining seats or a reasonable compromise between wagon-lit and couchette. Conversion to night arrangement would reduce the carrying capacity of some of the coaches. Special air-conditioned vehicles with fixed windows are likely to appeal to the Iron Curtain security authorities. In Italy, travel in and out of Venice and/or Trieste should be avoided, if possible, to save considerable time. " Night Ferry " arrival time in Paris and/or Brussels should, if possible, be brought forward to 8 a.m. on completion of electrification both sides of the channel.

Yours faithfully,

R. G. R. CALVERT

45, Woodways,
Oxhey, Herts

THE PROBLEMS OF FREIGHT TRAIN TRAFFIC

June 12

SIR, It was with something more than a passing interest that I read your correspondent's article on " The problems of freight train traffic " in the May 26 issue of *The Railway Gazette*, with particular reference to the final remarks.

The conclusion that the statistics indicate the London Midland Region to be overweighted in the effort to operate about a quarter of British Railways seems to me to be unrealistic. That region, in common with others, is surely proportionately subdivided into manageable lines, divisions and districts under the regional headquarters. In many other industries it is also the general trend to form large combines but one cannot say the overall efficiency and that of each member firm is thereby impaired—in the majority of cases the reverse applies consequent on streamlined management and an effective chain of command.

Some of the statistics quoted must be disappointing to the practical railwaymen and, in my opinion, the main contributory factors to this state of affairs would appear to be:—

(i) Acute staff shortages, particularly in the way of goods

handling and yard staff and train crews, with consequent inability to move traffic and/or empties as desired.

(ii) Extensive and ever increasing delays and inconvenience to the normal working occasioned by the massive projects in connection with modernisation.

(iii) Priority movement of selected traffics and empties. So far as the movement of empties is concerned, this is often to other regions at the expense of domestic requirements causing dislocation and inconvenience to the sending region.

In all respects, it is no secret that the London Midland Region suffers more than any other region and the relative statistics are, therefore, adversely affected.

So far as the question of regional boundaries or creation of another region is concerned, I agree with the implication that boundaries should be subject to review and adjustment in the light of changing circumstances, traffic flows, etc. The suggestion to create a Midland Region is a matter of opinion but, in view of the existing chain of command, would not appear to be warranted. In this connection practice has proved that, from an operating point of view at least, the penetration of the Eastern and North-Eastern Regions into the London Midland Region on such an expensive scale between Chesterfield and Skipton was a major blunder. I would suggest serious consideration be given to the return of that section of the ex-L.M.S.R. line—the Leeds, Bradford, Huddersfield, Wakefield, Sheffield, Rotherham, etc., area—to the London Midland Region and that the Eastern and North-Eastern Regions be combined to form a London & North-Eastern Region. There would thus be five regions, adequately sub-divided for administrative purposes and in a position to operate more efficiently by virtue of the through working—to say nothing of the economics of the proposal.

Yours faithfully,

THOS. J. JACKSON

27, Aston Avenue,
Kenton, Middlesex

[There are several other factors to be considered in addition to those which have been quoted. For example, the London Midland loadings for minerals at 16·32 tons per wagon are higher than those on any other Region, and coal-class traffic loadings at 13·06 tons per wagon are better than a year ago. Moreover, the increase in diesel speeds on the London Midland Region has been 28·6 per cent this year which compares with an overall rise of 5·8 per cent for all Regions. Nor must it be overlooked that, on that Region the train-load at 174·82 tons is higher than that for any other Region or that the average number of loaded wagons per train is the highest of all Regions.—ED. *R.G.*]

EVEN-INTERVAL TIMETABLES

June 5

SIR, Your leading article—" Even-interval timetable for Western Region "—(June 2 issue) must surely have filled the minds of old Great Western enthusiasts with gloom.

Was not one of the benefits promised from modernisation that of really fast expresses between important centres running at speeds comparable with those being regularly and punctually worked on the French railways at 70 m.p.h. and more ? Instead, the pattern that seems to be developing is one of improved services between intermediate places and a general overall deceleration.

The principle of standardised departure timings is excellent, but surely there is need to include in its framework some really fast expresses. One would have hoped to find the " Cornish Riviera " leaving at 10.30 a.m. and running non-stop to Plymouth in 3¾ hr. (I have seen it arrive at North Road diesel-hauled at just after 2.10 on its 4-hr. schedule). Similarly, in the Bristol programme, surely the " Bristolian " could have been re-timed on a 1-hr. 40 min. schedule.

In these days of intensive road competition one would have thought there was a real need for very fast expresses between the main centres. The intermediate centres could be dealt with by semi-fast trains, still in the pattern of standard departure times. It is true that both are needed, but surely it is a mistake to attempt to combine the two.

To take another case, I have long thought that, on the Southern Region, some—say alternate—45-min. past-the-hour trains from Victoria should run non-stop to Eastbourne as expresses in 70 or even 65 min.

Why all these trains should stop at East Croydon, Haywards Heath, and Lewes is hard to understand. Haywards Heath is already very well served and very often there is an equally fast train arriving there within minutes of the Eastbourne one.

I have two other points against British Railways. First, a growing tendency for important expresses to depart or arrive at an odd number of minutes. There are examples on all Regions and now we are to have a West of England express arriving at Paddington at 3.41 p.m. Why not 3.40 ? It cannot be necessary save in an intensive suburban service and it is untidy and hardly adds to the prestige of an important express. Second, the tendency of naming trains that are not worthy of the honour—for example, the " Cathedral Express." To be named, a train should already be famous for its comfort' service, speed, and punctuality—like the " Cornish Riviera,', the " Bristolian," and the " Cheltenham Flyer "—that were!

Yours faithfully,

G. E. THORNTON,
Lt.-Colonel

High Cross, Framfield,
Uckfield, Sussex

INEFFECTIVE RAILWAY MOTIVE POWER

June 12

SIR, If there is one clear point which emerges from your correspondent's summary of statistics in your issue of June 2, it is the consistent reliability of electric stock, notwithstanding the teething troubles which have beset successively the S.R. and L.M.R. locomotives as well as the a.c. multiple-unit stock in Glasgow and North East London. The wholesale failure of the latter—some 140 units—appears to account for the whole of the 2·5 per cent increase in electric units laid aside during the last year.

Bearing in mind that some 4 per cent of the electric multiple-unit fleet is always " stopped " for maintenance of equipment and bodywork, the average of approximately 3·5 per cent for other failures is quite creditable, and shows little variation despite increasing complexity of equipment.

What the figures do not reveal is individual regional percentages of stock under repair, and the nature of the failures (whether major or minor, of traction equipment, bodywork or auxiliaries) necessitating withdrawal from traffic. Figures for both these aspects would no doubt be most revealing.

Yours faithfully,

L. A. MACK

13, Upper Grotto Road,
Twickenham, Middlesex

MAKING USE OF UNECONOMIC LINES

June 21

SIR, Not long ago British Railways announced that it would build a four-mile stretch of test track; soon afterwards they abandoned the project because of lack of funds. In almost the same breath it announced the scrapping of many miles of line said to be uneconomic.

Why tear up good track when a suitable stretch or stretches could be fitted out and used in conjunction with private enterprise for tests and experiments in the same way as the motor industry's testing grounds ?

Yours faithfully,

R. C. STILLMAN

68, Queens Road,
Richmond, Surrey

The Scrap Heap

Stamps from Holland, Hungary, and Argentina, honouring George Stephenson and his achievements

Stamp of Approval

One of the six special stamps issued in Hungary this summer to publicise the Conference of East European Postal Ministers, bears the head of George Stephenson. The Hungarians have previously recognised Britain's railway pioneer, one of their stamps showed him with the *Rocket* in 1948. The latest stamp is shown in the illustration, which also shows two stamps issued in connection with railway centenaries, one from the Netherlands issued in 1939, and one from Argentina issued in 1957.

Historical details

The Coal Viewer & Engine Builders' Practical Companion was published in Sheffield as long ago as 1797. Anyone considering this to be the dawn of mechanical engineering would be surprised to find in this work comparatively detailed descriptions of plate ways, wagons, and pumping engines, complete with "Instructions to the blacksmith." It might also come as a surprise to find those pages of tabulated particulars, in which some modern textbooks abound, is not a recent development. The tables dealing with the weight of water in pumps give weights, in pounds, with what today would be regarded as an unnecessarily high degree of accuracy, these being carried to the fourth decimal place. History indeed repeats itself and the frogs used on early switches, in common with many of the latest, were castings. The illustrations are good; that reproduced shows the wealth of detail to which some of the early publications went. In some early views of fireboxes it was not unusual for the lumps of coal to be drawn. We are indebted to Mr. G. E. Embleton, of the Gloucester Railway Carriage & Wagon Co. Ltd., for his kindness in lending us this book.

A Bobby's job

The following correspondence comprises an extract from Mr. J. Whitbread's book "The Railway Policeman," which is reviewed editorially in this issue.

Ticket frauds and embezzlement

District Police Office,
Midland Station,
Blanktown.
April 1, 1958

A. Nicker, Esq.,
13, Queer Street,
Blanktown

Dear Sir, With reference to your name and address being taken by a member of the British Railways at Blanktown on Monday, March 17, 1958, the report on this case has been passed to me to deal with and I shall be glad if you will let me know where and when I can interview you on this matter.

You may call at this office between 9 a.m. and 6 p.m. daily, or any time at your convenience.

Yours faithfully,
I. N. FORMANT.
District Inspector

13, Queer Street,
Blanktown.
April 3, 1958

Dear Mr. Inspector, I got your letter yesterday, it came by post, and I am very sorry that your man had to take my name, age and occupation and where I lived because I forgot to pay my fare.

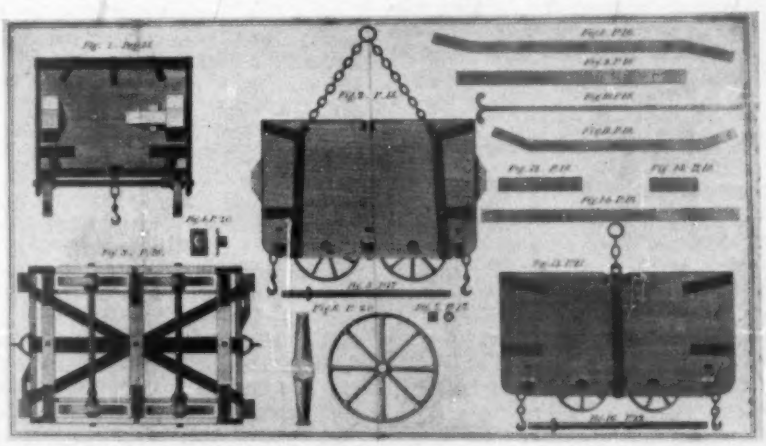
I will meet you if you want me to as you said but I don't like to be seen coming to the police office at the station as somebody may fluff I've been done by the bogies, so I would like it better if you came to my convenience as you suggested. It is a funny place to meet me but I suppose you know your own business best and have to be careful so its alright by me as nobody will know who you are and what you are coming for or that you are a bogy.

I should tell you that our convenience is an outdoor one and is shared by three other families, which includes my brother-in-law Alfie, his wife and three nippers who live with us and the two families next door. You will find it easy if you go straight through our side gate and down the yard. It has a green door.

I do not get home from work until after 6 o'clock at night, but if you will tell me any time after that and what day I will be there waiting for you.

Yours truly,
ARTHUR NICKER

P.S.—I nearly forgot to tell you. Our convenience has got no light so if you come after dark you will have to bring your police light with you.



Illustration, showing wealth of detail, reproduced from a technical publication dated 1797

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

INDIA

First C.T.C. in India

The Ministry of Railways has decided to allocate a sum of £3,750,000 for the equipment of the 258-mile section of the link between Siliguri and Amingaon with centralised traffic control, the first in India. It is expected that this system of control, when complete in about two years' time, will increase the capacity of the section from 15 to 24 trains each way daily; the whole is single line.

SWITZERLAND

Doubling the Lotschberg line

Work is to begin this year on doubling the Lötschberg main line over the 8¼ miles between Spiez and Frutigen, except for the mile-long Hondrich tunnel, shortly after leaving Spiez. Doubling will be carried from Spiez Station to the tunnel mouth, and will recommence immediately beyond it, at the present Hondrich Sud block post. Automatic signalling through the stations of Heustrich, Mülenen and Reichenbach will replace the present manual signalling.

FINLAND

Line closed to passenger traffic

The company-owned narrow-gauge line between Hyvinkää and Karkkila has been closed to passenger traffic. Permission has also been given to close down less-than-wagon-load goods traffic at certain flag stations on the same day. At the present time this is the only narrow-gauge line in Finland open to passenger traffic.

NEW ZEALAND

Ballast wagon

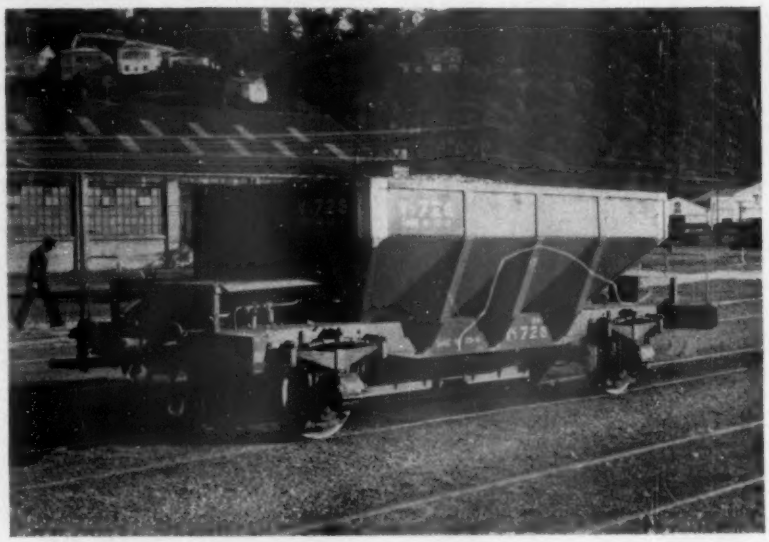
The wagon illustrated on this page is one of a new design being introduced on New Zealand Government Railways. Designated "Yc," it can carry 11·2 cu. yd. of ballast, almost twice the capacity of the "Yb" wagon it replaces.

Enquiry into night-shift pay and conditions

The Minister of Railways, Mr. J. K. McAlpine, has appointed Mr. C. A. McFarlane, former Director-General of the New Zealand Post Office, as a one-man commission to make a special investigation into conditions and rates of pay of railway night-shift workers. Mr. McFarlane will investigate the incidence and conditions of rostered night-shift work in the Railways Department and the extent, nature, and differences of such work compared with industrial workers and shift-workers employed in other departments. He will also advise the Minister whether rostered night-shift railway workers are adequately paid.

Road-rail deviation

With a view to substantial savings in overall construction costs, the New Zealand Government is to investigate proposals for a combined road and rail deviation some five miles south of Taihape. This stretch of the North Island Main Trunk Line is one of the worst portions of the railway between Wellington and Auckland. The route is tortuous, insecure, and subject to the danger of slips or washouts. On its present route, the railway includes two large, ageing, steel viaducts, now proving costly to maintain. There are also six tunnels, restrictive on load sizes, and through very unstable country. The nature of the area is such that no real improvement could be made to existing alignments. If built, the new route would facilitate each of the 24 trains daily using it to haul an extra 150 tons.



"Yc" class ballast hopper wagon

SOUTH AFRICA

Improvements at Pretoria

Considerable modernisation is in hand in the Pretoria area. Two extra 1,100-ft. island platforms and extensive remodelling of the yard at Pretoria are being undertaken. A non-whites' station with two 720-ft. covered island platforms is being built at Bosman Street (Pretoria). Two signal cabins, one power and the other mechanical, are being constructed.

ANGOLA

Railway to carry ore to Lobito

The Cia. Mineira do Lobito, Angola, has signed a contract with the Benguela Railway Company for the building of a branch railway to transport ore from the Cuima mines to the port of Lobito.

UNITED STATES

Santa Fé's 2,600 miles of microwave

The Atchison Topeka & Santa Fé administration is equipping its trunk main lines, 2,600 miles in extent, with microwave radio communications. Some 530 miles are already installed and a further 970 miles are under construction. The whole programme is expected to cost £1,920,000. The system is used for the transmission of traffic control code.

HEAVY-CAPACITY BOGIE OPEN WAGON for Indian Railways

Primarily designed for transporting coal, this wagon provides carrying capacity of 80 tons

by A. C. BHATTACHARYA, A.M.I.P.E., A.M.I.Loco.E., A.M.A.I.E.E., *Assistant Production Engineer, Eastern Railway of India*

THE development of steel plants in the country has given rise to increasing demands for facilities for the transport of coal and iron ore in larger quantities. To meet this demand, a new improved type of heavy-capacity bogie open wagon has been introduced by the Indian Railways.

The wagon was primarily designed for transporting coal from the coal washeries to the steel mills. It was subsequently checked and considered suitable for carrying back iron ore to the steel mills located in the vicinity of the washeries so as to fit into a close-circuit operation.

Increased carrying capacity

The new wagon, designated as "BOX," provides a carrying capacity of 55 tons within a total gross load of 80 tons against the carrying capacity of 22 tons of ordinary four wheelers. The load of goods trains with these wagons will be 3,000/3,600 tons against 1,500/2,000 tons of goods trains with ordinary wagons.

The underframe is of special design. It is fabricated by part riveting and part welding. It has a centre sill of hat section which takes the buffing and draw load. Crossbars, headstocks, and bolsters are all pressed-steel plates. Headstocks and bolsters are from 10-mm. plates while crossbars are pressed from 6-mm. plates. They are of cantilever type branching out from the centre sill to hold the two solebars on either side. They are secured to the sill by riveting.

Crossbars are spaced apart by means of stringers running parallel with the centre sill and the solebars. Stays at the points where crossbars are joined to the centre sill prevent the centre sill being pushed inwards.

The underframe is gussetted at the top by means of floor plate. Bolsters are stiffened by double gussets. All gussets are riveted.

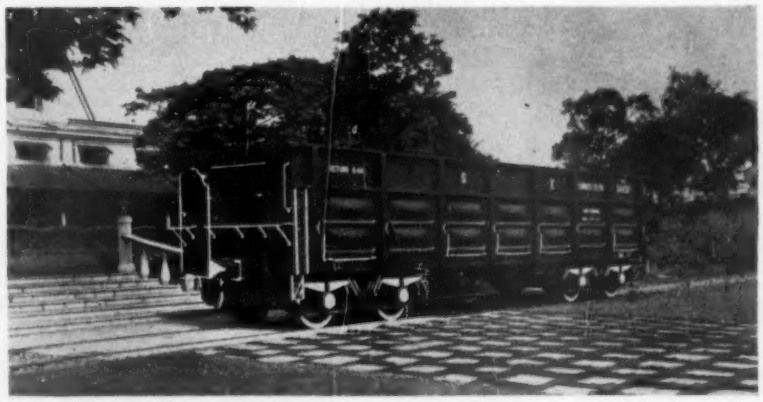
All-welded bogie

The bogie is of all-welded construction. It has sole plates fabricated of I-section. Soleplates from 8-mm. thick steel plates are joined together by means of a box-type construction which acts as a fixed bolster. The squareness of the frame is ensured by means of four diagonals made of channel section.

Bolsters are fitted with centre pivots and non-adjustable side bearers. The pivots have spherical contract surfaces to allow movements on three planes of motion encountered in the actual run.

The wheels are multiple-wear, solid-forged of 1-metre diameter. Roller bearings housed in cast-steel axle-boxes are fitted in all cases. Laminated bearing springs made from ribbed and grooved-type spring plates, and having a stiffness of 5·67 mm. per ton, and with long shackle suspension carry the load on each wheel.

The bearing spring buckle is provided with a pivot which fits in the crown of the axle-box. This arrangement enables the shuttling force to be transmitted directly on the axle-box, thus avoiding the contact of the axle-box with the horn check in normal circumstances.



General-purpose open bogie wagon for broad-gauge Indian lines

Power brake

The brake gear comprises the automatic vacuum brake incorporating auxiliary equipment such as empty-load box, slack adjusters, etc., to ensure maximum efficiency of the brake power from unloaded to loaded conditions.

In addition to vacuum brake, the wagon is fitted with end-operated screw-type handbrake. Braking is effected by operation of a handwheel provided near the end coping in a vertical position.

Connection to the brake rigging is achieved by means of necessary shafting and gearbox. The brake riggings and gears are of lightweight construction.

The body is of riveted construction and is built up of 4-mm. mild-steel plates for the sides and ends; 6-mm. thick plates are used for the floor. The body stanchions along with coping channels and gusset plates give adequate strength and stiffness to the wagon. The ends are reinforced with channels.

The body stanchions are of folded plate construction from 8-mm. steel plates. They are attached to the solebars by riveting. The wagon is provided with two doors each side with two blanks, which can be opened out to form seven doors when full-welding is adopted in the construction and the stresses in tests to be carried out on these at a later date are measured. This has been kept in view to effect a quicker discharge. With seven doors a side and all doors fully opened, a discharge of 40 per cent of the coal will be ensured.

Draft and buffing gear

The wagon is fitted with automatic centre buffer couplers to reduce the time taken for train formation in yards. They conform generally to the requirements of the A.A.R. "E" type. Suitable draft gears are provided.

Leading particulars of the wagon are as follow:—

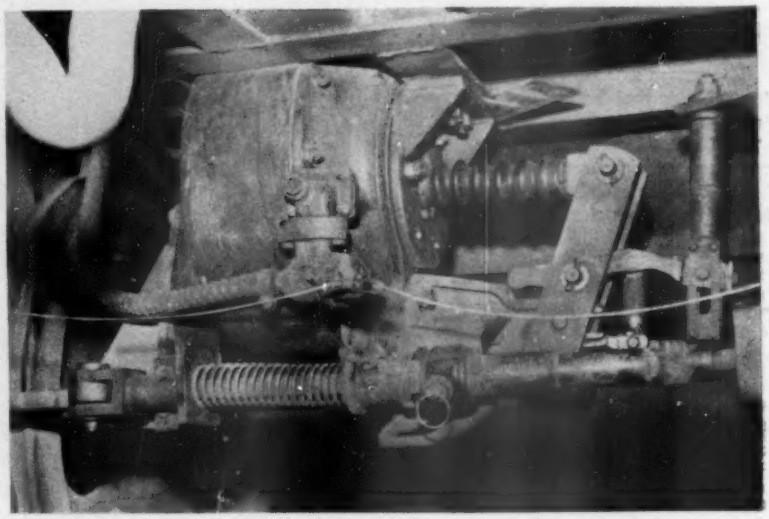
Gauge	1,676 mm. (5 ft. 6 in.)
Length over headstock ...	12,800 mm.
Inside width	2,853 mm.
Inside height	1,880 mm.
Bogie centres	8,800 mm.
Rigid wheel base of bogie truck	2,000 mm.
Pay load	55 tons min.
Maximum load on rail per axle	20 tons
Gross load per ft. run on track	1·77 tons

AUTOMATIC TWO-STAGE DISC BRAKE for British Railways

Provision of suitable brake power for freight vehicles when empty or loaded

THE automatic two-stage disc brake consists essentially of a double-fulcrum device mounted on a horizontal diaphragm-type vacuum cylinder, either of the two fulcrum points being selected automatically by a loaded or empty vehicle. The force from the vacuum cylinder is transmitted via the leverage selected to a caliper mechanism which forces non-metallic brake pads against machined faces on the webs of the wheels.

The brake is compact and is suitable for wagons having bottom discharge doors where centre pull rods are impracticable. On a four-bottom-door hopper wagon the brake equipment will fit neatly into the apex between hoppers without interfering with existing door gear. No transverse equalising beams are required and the axles are clear of obstructions thus enabling existing wagon-moving equipment to be used.



Underside of 21-ton hopper wagon with 14-in. vacuum cylinder, two-stage changeover gear, and slack adjuster

Diaphragm cylinder

A 14-in. dia. diaphragm cylinder is used in conjunction with an automatic single-acting slack adjuster to operate the disc brakes. On hopper wagons two sets of equipment are provided, one for each pair of wheels. On mineral wagons one set is used for both pairs of wheels. A spherical bush is fitted in the cylinder cover, in order to allow angular movement of the piston rod to suit the brake rigging. The piston rod is enclosed by a p.v.c. miniature sack which also acts as a vacuum-tight seal to isolate the train pipe side of the cylinder from the atmosphere. A standard combined ball-and-release valve is also provided.

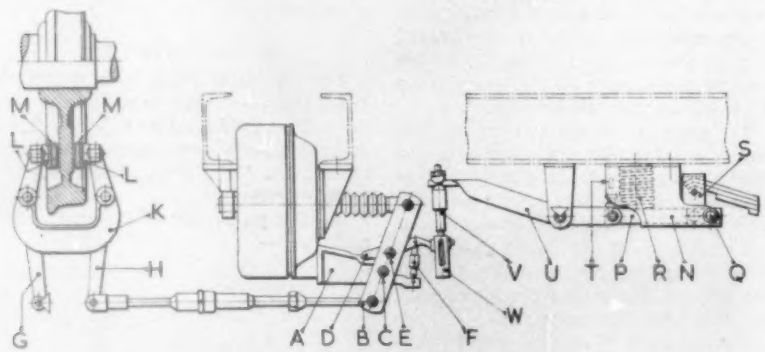
The slack adjuster is controlled by an actuating plate secured to a fixed point on either the cylinder or one of the rigging supports, according to the type of wagon. The maximum take-up is 6 in.

The brake cylinders should normally run from shop repair of the wagon without attention.

The brake pads are replaced when the friction material has worn down to ¼-in. thickness; worn conditions can be determined by a visual examination of the brake pad, without removing it from the shoe.

The brake pads may be easily removed from the shoes for replacement.

A diaphragm-type vacuum cylinder is mounted rigidly on the vehicle underframe. As seen in the layout diagram a fulcrum bracket A, secured to the cylinder, supports twin levers B, the upper ends of which are pivoted to the cylinder rod, the lower end being connected via a slack adjuster to the caliper mechanism. The levers B are normally supported by the pin C, which in the tare condition is free to slide in a slot in the fulcrum bracket.



Layout of two-stage disc brake, showing mechanism in tare condition of vehicle with brakes off

Changeover gear

With the vehicle empty a fulcrum strut D pivoted to the levers B by fulcrum pin E is held into an abutment on the fulcrum bracket A by the spring F. Thus when the cylinder applies a force to the levers B the latter pivot about the pin E and have an effective leverage of 1/1. When the vehicle is loaded, the fulcrum strut D is caused to pivot out of engagement with the abutment face. The levers B thus pivot about the pin C which abuts against the bottom of the fulcrum bracket slot giving an effective leverage of 2½/1.

The caliper mechanism comprises two levers G and H pivoted to a yoke K and having at their inner extremities pivoted brake shoes L carrying brake pads M.

The outer end of lever G forms a fixed fulcrum attached to an underframe bracket, and the corresponding end of lever H is connected to the slack adjuster and is guided in a slotted support bracket. The caliper is supported at the shoes by suspension links, which take the braking drag force and restrain the shoes substantially parallel to the braking faces on the rail wheel, and allow the mechanism to float with any axial movement of the wheel.

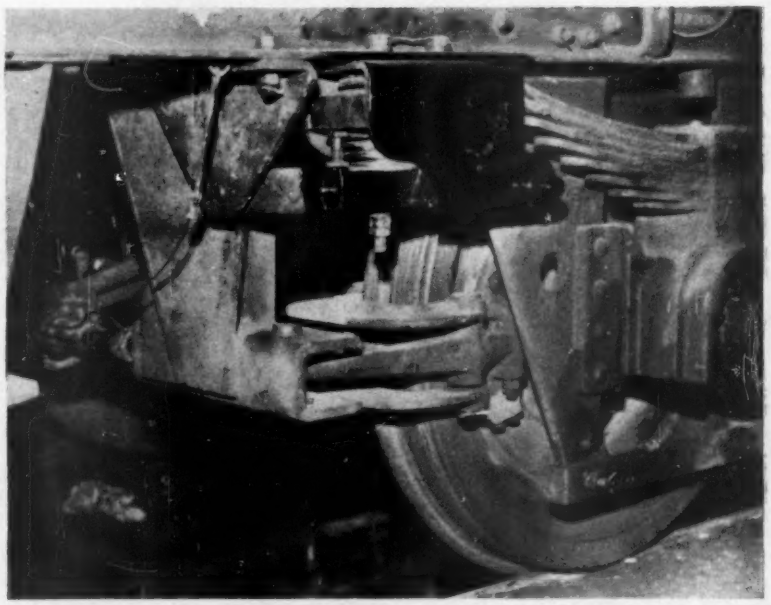
Attachment to solebar

A pressed bracket N, of channel form, is attached to the vehicle solebar adjacent to one end of the wagon spring. A beam P pivoted to the bracket by a pin Q is forced downwards against a stop by a spring R. One end of the wagon spring is supported by a stirrup S attached to the beam P, the load (including dynamic effects) so applied being carried by the spring R without deflection.

When the wagon is loaded to 66 per cent capacity the spring R is compressed, and the beam P abuts against the stop T. In this position the spring R is designed to cater for dynamic loading without forcing the beam P away from the stop T. Thus there is no flutter of the mechanism in either position provided the wagon is empty or loaded to a minimum of 66 per cent.

Movement of the beam P is transmitted via a pivoted arm U and a compression spring V to the fulcrum strut D, thus selecting the appropriate fulcrum pin in the levers B.

The spring V and slotted clevis W enable a vehicle to be loaded or unloaded, with the vacuum brake applied, without damage to the mechanism or involuntary release of the brake. Normal release of the vacuum brake will then allow the mechanism to select the appropriate fulcrum and successive brake applications will be at the correct ratio for the wagon weight.



Brake-caliper levers and spring-end weighing mechanism for automatic changeover device of two-stage brake, as fitted on 21-ton wagon

The disc brake system has been developed under the general direction of Mr. J. F. Harrison, Chief Mechanical Engineer, British Railways Central Staff, British Transport Commission, by the Locomotive, Carriage & Wagon Development Unit, Darlington, and Girling Limited.

Readers requiring further particulars of disc brakes are referred to page 337 of the issue of *Diesel Railway Traction* for September 1956 and page 121 of the March 1958 issue.

CASTING THE MR-1 SLEEPER by automation

Specially-developed machine produces nearly 140 prestressed concrete sleepers in an hour

Now that the MR-1 type of prestressed concrete sleeper has been approved by the Association of American Railroads —as recorded in an editorial note on another page—a company in the United States has designed and is turning out a special machine for producing it.

This machine is capable of individually casting nearly 140 MR-1 sleepers an hour, automation being used throughout the process. Its cycle begins when a pallet forming the bottom of the sleeper rolls on rails into the machine. The ends of the pallet are designed to anchor the ends of the four $\frac{7}{16}$-in. prestressing strands, which are fed into the pallet, measured, cut with 0·01-in. tolerance, and locked into the anchorages, all within a period of only 9 sec.

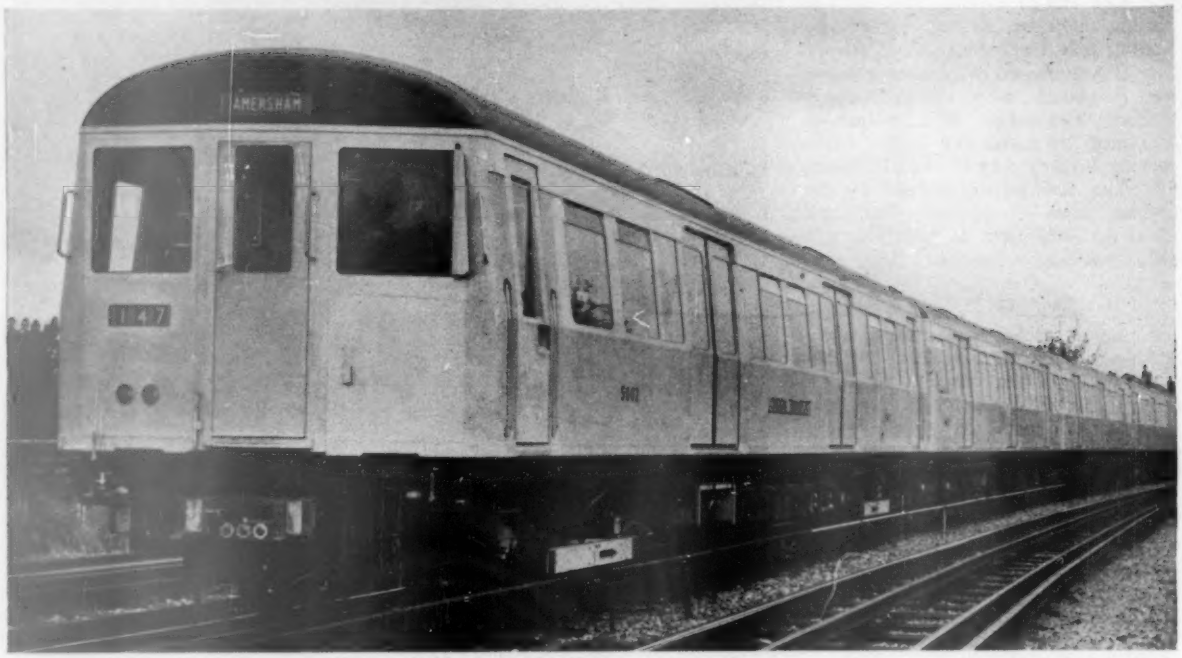
The strands have an initial strength of 135,000 and an ultimate strength of 180,000 lb. per. sq. in. The prestressing is done with hydraulic jacks at one end of the strands, the other end being fixed. A dry 8,000-lb. per sq. in. concrete mix is then placed, and thereafter the sleeper is moved from the casting platform, the whole process having taken only 26 sec.

Curing and vibration

The sleeper then passes into a chamber for curing by steam heat, this part of the process taking 14 hr. External vibration is effected with a vibrating table beneath the sleeper and a pressure plate above it. Abrasive saws automatically cut the strands after the sleeper is removed from the curing chamber, where 540 sleepers can be cured during each 14-hr. cycle. Electronically-controlled trolleys, each carrying 36 sleepers, remove them for storage.

Railway engineers and the American Concrete Crosstie Corporation, manufacturers of the machine, have devised a wedge-anchor that can be removed from the top of the sleeper and takes the clip-assembly rail-to-sleeper fastening.

Removal of the fastening from the top of the sleeper has advantages from the point of view of maintenance. In certain circumstances, it can avoid the necessity of disturbing the sleeper in the ballast.



New eight-car train of A.60 stock

NEW ROLLING-STOCK for London Transport

Trains for Amersham, Chesham and Watford electrified services

KNOWN as the A.60 stock, the first trains of London Transport's new cars for the Metropolitan Line services to Amersham, Chesham and Watford are now in service. These cars are the first of 248 ordered in 1959 for the complete replacement of the present electric multiple-unit and locomotive-hauled compartment stock trains on the services concerned.

Driver's cab

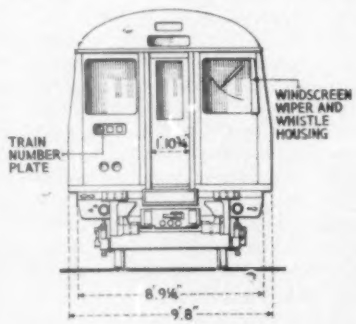
A further 216 cars of similar type, but to be known as the A.62 stock, are on order for the replacement of all the present trains used for the Metropolitan Line Uxbridge services. They will be delivered after the A.60 stock order is complete. The main contractors for both rolling stock orders are Cravens Limited.

The design was evolved to deal with the varying demands of the Metropolitan Line with its short-section high-intensity in-Town services as well as those to the wider-spaced stations beyond London.

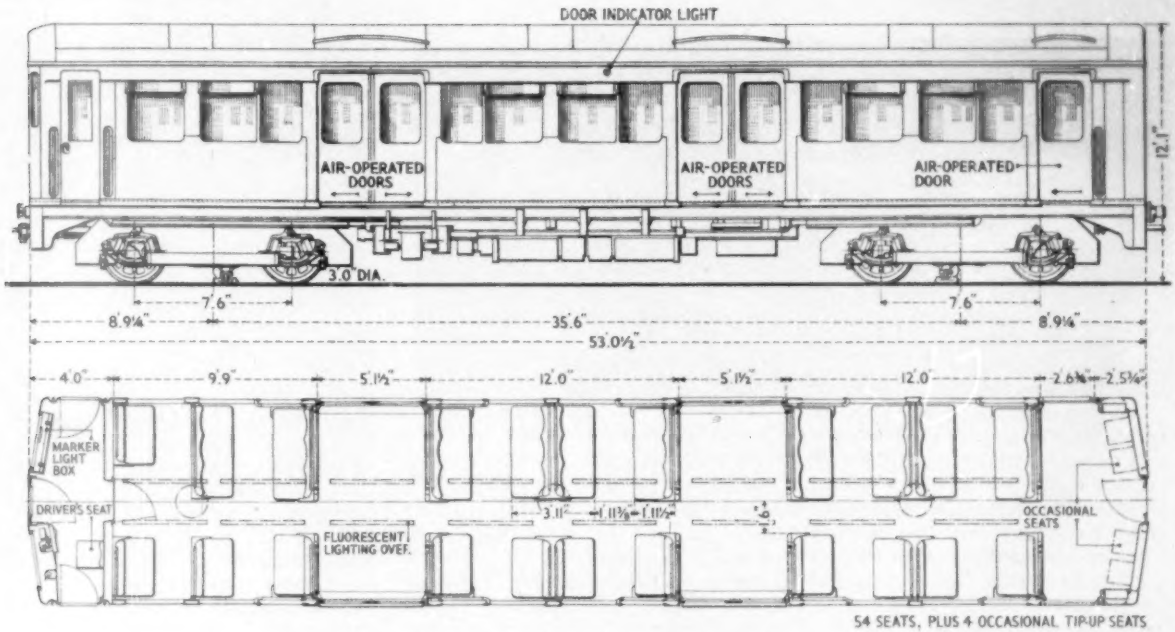
Eight-car rush-hour units

The 248 cars of the A.60 stock are divided into equal numbers of driving motored cars and trailers. In peak hours, they will run as eight-car trains, a train being made up of two four-car units, each consisting of a driving car two intermediate trailer cars and a second driving car. The four-car units can be used individually, if required, in off-peak periods. All axles of the driving cars are motored.

The bodies of the cars are of aluminium alloy, unpainted. Parts of the structural members of the body form the exterior face of the cars. This eliminates panelling on this part of the car body and also a certain amount of panel riveting.



End elevation



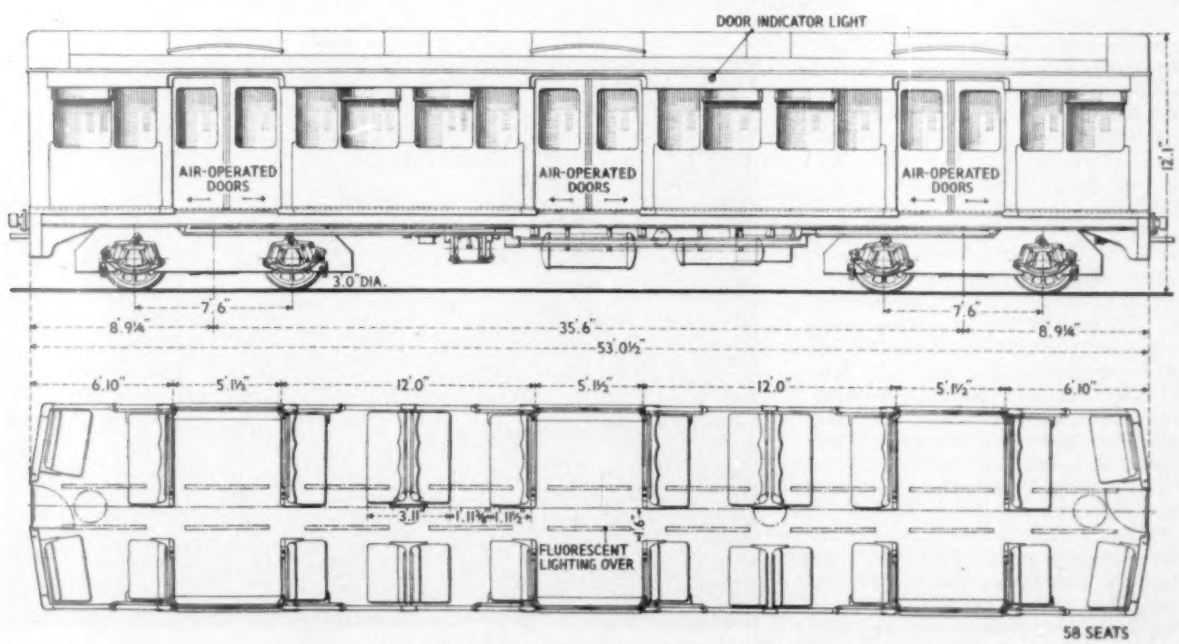
Motor car of Metropolitan Line new stock

The bogies are riveted up from welded sub-units, which are stress-relieved before assembly. The bodies are carried on the bogies by centre plates and side rollers. Rubber units are used for both primary and secondary suspension, the axlebox springs being of the rubber-bonded chevron-type housed in cast-steel yokes provided with means for adjusting the frame height. Hydraulic dampers are fitted to control the vertical and lateral movement of the bolster. Roller-bearing axleboxes are used throughout.

Double-block braking, with non-metallic brake blocks carried in cast-steel brake heads, is used on all wheels. An individual brake cylinder with slack-adjuster unit is used for each brake block.

Radial-type positive and link-type negative collector shoes are fitted to all motor bogies.

The bodies incorporate a number of features new to London Transport rolling stock. Construction of the body and underframe is in light alloy, except that headstocks and underframe bolsters and their connecting longitudes are welded-steel fabrications. Whilst all longitudinal members are extrusions, crossbars between bolsters are combined aluminium castings and extruded ties. Extrusions are in light alloy to B.S. 1476, H.E. 30 WP; exterior panels in B.S. 1470, N.S. 5¼ H; forgings in B.S. 1472, H.F. 30 WP; and castings in B.S. 1490, L.M. 6–M. The carlines, which are rolled to the roof radius, are connected to the top flange of the cantrail extrusion, a main structural member which stretches



Trailer car of Metropolitan Line new stock

Two-motor bogie, showing rubber suspension for axleboxes and bogie bolster, and link supporting negative shoe

the full length of the car. Light-alloy castings have been used for doorway pillars and corner pillars; these castings also form the exterior face of the car in their respective positions. The pillar sections incorporate slots, to hold the interior panelling, and preformed grooves, in which rubber glazing is fitted to hold the ¼-in. armour plate glass used for the side lights. Except where constructional members form the face, the car is panelled in ⅛-in. aluminium-alloy sheeting, riveted to the framing by light-alloy rivets finished flush with the surface.

The roof is panelled in 14-S.W.G.–aluminium-alloy sheet at doorways and in 15-S.W.G.-sheet elsewhere. Floors are of corrugated 16-gauge-light-alloy sheeting (N.S. 3) with 1-in. corrugations. On top of the corrugated sheeting is a layer of hardboard with 21/32-in.–grooved-maple boards laid as the finishing surface.

All passenger seats are upholstered in grey-and-maroon patterned moquette and fronts are faced with leather. The seat frames are aluminium-alloy castings and grab handles of satin-chrome finish are fitted to the gangway ends of seat frames in the centres of bays. The seating layout will be seen on reference to the drawings.

Interior decoration

The ceilings generally are in white-painted hardboard, the space between this and the exterior roof panelling being packed with insulating material. The interior decoration is in grey with dark red relief; extensive use has been made of melamine-faced plastics. The end walls are finished in Warerite "Red Relief" and the side-walls in Warerite "Stardust Grey." A lighter-grey panelling is used above window level.

Following the practice in the Central Line prototype trains, the P.C.M. type camshaft control equipment controls four 300-V. motors, the two motors in each bogie being permanently connected in series. The increased output required has been achieved without increasing the overall dimensions of the standard equipment case, the limiting dimensions of which are determined by the space available on Tube stock cars. The same case is used for both Tube and Surface stock to obtain the benefits of standardisation. The new equipment can deal with a maximum current 50 per cent higher than that of a two-motor equipment.

Motor equipment

The four-motor equipment is basically similar to the standard two-motor equipment, with series-parallel control. Protective devices have been fitted to safeguard against the possibly-serious consequences should the wheels driven by one motor of a pair begin to spin. They consist of two differential voltage relays —one for each pair of motors. Each relay has two coils, each coil being connected across one of the pair of motors in a bogie. Should wheel spin occur, the voltage balance across the pair of motors will be disturbed. The relay will then operate and open the line breakers, causing the camshaft of the control equipment to return to the "off" position. The equipment will then notch up again automatically.

Power cabling

All power cabling on these cars is in a composite rubber/neoprene cable, which has a natural-rubber dielectric with a neoprene sheath.

The L.T.114-Type traction motors are the first 300-V. motors to be ordered in large quantities by London Transport. They have a continuous rating of 66 h.p. on full field. The motor is of the axle-hung nose-suspended type, the nose being supported on the bogie by means of a steel link with resilient bushes at the two ends. The motor is fitted to the axle on the London Transport type of roller-bearing suspension sleeve which is of cast instead of the former welded construction. The usual suspension bearing caps, which clamp round the suspension sleeve to locate the motor, have been replaced by cast seatings on the suspension sleeve. The motor is bolted to these cast seatings, giving a very positive location of the motor and facilitating its fitting and removal.

The low tension supplies for 115-V. a.c. fluorescent lighting and 50-V. d.c. auxiliaries are obtained from a motor/alternator/rectifier set, the alternator being of the inductor type with an output of 6 kW. at 220V. single phase, 850 cycles per second. The output to the main fluorescent lighting at 115 V. is by step-down transformer.

Interior of trailer car, showing all-transverse seating, route diagrams, and parcel racks above windows

A separate winding on the main transformer, feeding a germanium full-wave bridge rectifier, provides 50-V. d.c. supplies for battery charging, control, brakes and doors and miscellaneous purposes. The usual 46-V. lead-acid battery is connected to the rectifier terminals via a smoothing choke to protect it from the effects of voltage ripple. The presence of a rectifier in the d.c. feed eliminates the need for a battery contactor and a reverse current relay. The d.c. voltage is controlled by a magnetic-amplifier type regulator which has no moving parts. This supersedes the vibrating-carbon type previously used, which, though of proved reliability, requires considerable maintenance. The main transformer, rectifiers, smoothing chokes, and static regulator have been designed as a composite unit which can be removed from the auxiliary equipment case as one assembly.

Emergency lighting

To provide emergency lighting which will remain on in the event of a motor-alternator or a power failure, three of the fluorescent lamps in each car are fed constantly from the 50-V. d.c. supply via individual transistor–inverter units.

Heaters of the Pyro-bar type are mounted on the seat risers and are controlled from the guard's control panel. They consist of sheathed elements embedded in cast mountings with a deflector plate on the front to keep the surface temperature to an acceptable value. Because of the longer passenger journeys on the Metropolitan Line, the heating has been increased to 7 kW. per car, the figure being limited by the number of seat risers on which it is possible to fit heaters.

All modern London Transport brake and door valves have flanged fittings, bolting on to port plates, to complete the air connections and to facilitate valve changing. Hitherto, connections for the coil and interlock leads have been made separately. On this stock all the brake valves and the more important door valves have been made of the plug-in type. Valves can now be changed merely by removing the fixing nuts. This reduces the time required to change a valve and eliminates the possibility of failures due to damaged or wrongly-connected leads.

The brake-valve coils work in particularly arduous conditions because of the oil and moisture in the air supply. These coils are now potted in epoxy resin to improve their reliability. The coil leads are attached to the coil by tapped terminal inserts moulded into the coils, so that the potted coil does not have to be scrapped if the leads become damaged.

Compressed air is provided by synchronised reciprocating two-stage compressors, one being fitted on each trailer car.

Normal service braking

Normal service braking is electro-pneumatic, with self-lapping driver's-brake valves, and uses the standard London Transport form of retardation control. Automatic air brakes are provided for emergency use.

The train performance has been arranged to conform, as to speeds attainable, with existing stock running over the same lines. The requirements for the high-density inner sections of the Metropolitan Line, and for the outer sections, differ more than those of any other London Transport line, because of the greater disparity in the distance between stations. This problem was met by using the flag indicator switch in the driver's cab to control not only the motor field strength but also the notching relay setting and thus the acceleration rate. On inner sections the flag switch is kept down and a high or low acceleration rate is available, together with the low balancing speed obtained by running in full field. The lower rate of acceleration is required for bad adhesion conditions. On outer sections, with the flag switch up, the lower rate of acceleration is obtained, but the balancing speed is increased by the use of a 60 per cent full-field characteristic. The stock is designed to operate up to a maximum speed of 60 m.p.h.

The saving in weight of the new stock of over 20 per cent compared with similar length trains of the existing stocks, results in an appreciable saving in energy consumption, although this does not vary directly with the saving in weight, as on the longer runs a large proportion of the energy is used to overcome train resistance, which does not decrease in the same ratio as the weight.

Each of the new motor cars is fitted with a wedglock automatic coupler redesigned in the C.M.E.'s drawing office at Acton to provide for reversibility of units. Hitherto, London Transport multiple unit stock has been non-reversible and a unit turned round end-for-end in normal service could not couple operationally to a unit which had not been turned. In order to provide reversibility, most of the train wires have to be duplicated at the coupler face and this in turn affects the design of the automatic coupler which has to house 64 contact studs in the very limited space available.

The reversibility feature will be of particular use in enabling trains to be worked round the Watford–Rickmansworth triangle without the need to ensure that they are always brought back on to the main line facing in the right direction.

The weight of a motor car is 31 tons and that of a trailer car 21 tons.

The bodies of the new Metropolitan Line stock were designed by Cravens Limited to the requirements and approval of Mr. A. W. Manser, Chief Mechanical Engineer (Railways), London Transport, and the bogies were designed under Mr. Manser's direction at Acton Works.

Contractors

Principal and sub-contractors include the following:—

Car bodies and bogies	Cravens Limited
Traction control equipment	Associated Electrical Industries Limited
Motor alternators	Associated Electrical Industries Limited
Rectifier equipment	Associated Electrical Industries Limited
Auxiliary contactors	Associated Electrical Industries Limited
Speedometers	Associated Electrical Industries Limited
Traction motors	Associated Electrical Industries Limited
Chokes, capacitors, transistor inverter units, for fluorescent lighting	General Electric Co. Ltd.
Air brake equipment	Westinghouse Brake & Signal Co. Ltd.
Air door equipment	G. D. Peters & Co. Ltd.
Car doors	Dialoy Limited
Auxiliary electrical equipment	Patent Lighting Co. Ltd.
Axleboxes	Hoffmann Manufacturing Co. Ltd.
	British Timken
Suspension units	British Timken
Loudaphones, etc.	Clifford & Snell Limited
Batteries	Pritchett & Gold and E.P.S Co. Ltd.
Auxiliary lighting equipment, etc.	Benjamin Electric Limited
Automatic couplers and disconnecting units	A.E.C. Limited
Axlebox springs	Metalestik Limited
Route diagrams	Bakelite Limited
Windows	Hallam, Sleigh & Cheston Ltd.

LIFTING BARRIERS IN NORTH EASTERN REGION

Power-operated lifting barriers, which have been installed at Teams Crossing, Dunston, are the first of a new Continental type to be seen in the North East.

The principal advantage of these barriers has been to enable the road to be widened, for operation of broader gates of orthodox design would have been awkward and slow.

The pairs of lifting half-barriers at each side of the crossing are operated electrically and are controlled by the signalman in the adjacent signalbox. The time taken for lifting or dropping the barriers is approximately 8 sec.—a considerable saving of time compared to crossing gates. Flashing pairs of red lights warn road traffic in each direction when the booms with their suspended rod "skirts" are about to descend. When in either the up to down positions the barriers are locked firmly in position.

The barriers, which conform to Ministry of Transport requirements, were designed and constructed by the Westinghouse Brake & Signal Co. Ltd. and installed by the Signal & Telecommunications Engineer, British Railways, North Eastern Region. The road improvements have been carried out by the Durham County Council on behalf of Whickham Urban District Council and Gateshead Corporation.

MECHANISED OFFICE EQUIPMENT on New Zealand Railways

Use of machines helps centralisation and results in substantial annual savings

THE New Zealand Railways, in pursuance of its policy of introducing modern equipment to increase efficiency, has made extensive use of mechanical office appliances. Large numbers of adding, book-keeping, calculating, and similar machines are in use in offices throughout the system and in the Chief Accountant's office at Wellington.

The introduction of machine methods has resulted in goods accounting work being now centralised to some degree at all the main offices. Particularly does this apply at Auckland, Wellington, Christchurch, and Dunedin, where the larger installations now handle the accounting work of many country and suburban stations, thus reducing staff required in those localities.

Progressive mechanisation

A progressive plan to mechanise all suitable accounting applications with the use of modern punched-card and electronic machines has been in operation for several years. Equipment of the latest type was installed at Wellington in 1957, and this was followed by the setting up of a similar smaller installation at Auckland. All the equipment in use is hired from the manufacturer, the charges also covering the training of staff and upkeep of machines.

This equipment is now used for the preparation of fortnightly payrolls, with individual pay dockets for each employee, for nearly 6,900 of the department's 26,000 employees. In addition it is used for compiling freight statistics, and for ledger accounting work at Wellington and Auckland.

A new Type "1401" electronic data processing system with four magnetic-tape units has been ordered for Wellington. This system is fully electronic and completely transistorised and will replace all the major machines now in use there. Delivery is expected early in 1962. The "1401," with its high output capacity, will increase the work potential of the installation at least three times, and will also simplify and eliminate many of the procedures now being followed.

Ticket-printing equipment has been installed at Wellington suburban booking office

Ticket printing and issuing machines were first introduced by New Zealand Railways in November, 1956. There are now two Rapid Printers and one Mini Printer in use in the suburban booking office at Wellington. Another Mini Printer was brought into use at Petone in 1960 and a further four machines are on order for installation in other suburban stations in the Wellington area.

Substantial savings

Five Ormegraph machines were introduced in 1956. Two were installed at the Wellington long-distance booking windows, another at Palmerston North Station, and a fourth at the Department's road services booking office at Wellington. Seven more were brought into use in 1960.

The ticket-issuing machines in use at Wellington and Palmerston North alone save the preprinting costs of more than a million card tickets each year, and also save the incidental costs of maintaining ticket stocks.

Three machines simultaneously producing payrolls, pay dockets, and summary cards from two files of punched cards

ELECTRIC RAILWAY TRACTION SECTION

International freight expresses

THE European Timetable Conference for freight traffic which met recently in London under the auspices of the International Union of Railways (U.I.C.) put the finishing touches to the timings of the new European international freight expresses called the " Trans-Europ-Express-Marchandises " (T.E.E.M.) which began running on principal Continental arterial lines on May 28 last.

The creation of these freight expresses follows the introduction of the " Trans-Europ-Express " passenger trains which began running in 1957. The T.E.E.M. trains are remarkable both for their speed of up to 63 m.p.h. and their short stop at frontier stations where they should not be held for more than two hours. They are regular trains which, like passenger expresses, run every day to a fixed schedule, irrespective of the amount of traffic to be moved. Their running is also as closely supervised, thanks to the very efficient system of telecommunications with which each of the railway systems concerned is equipped.

This particularly rapid transit is provided, in principle, for international freight traffic forwarded by G.V. (*grande vitesse*) and also P.V. (*petite vitesse*) consignments which the senders consider require fast transits (perishables, groupage traffic, etc.). The T.E.E.M. trains cover about 30 international transits in Western and Central Europe such as Hendaye-Dunkerque, Dunkerque-Strasbourg-Basle, Chiasso-Basle-Thionville-Zeebrugge, to mention only the principal ones providing connections with train ferries to and from Great Britain.

Electrification progress in Germany

THE important main-line section of the Ruhr area railways between Oberhausen and Dortmund has recently been electrified, a course which is expected to result in 20 to 25 per cent reductions in travelling times over short distances. At present, total electrification on the Ruhr network amounts to 1,170 km; it is planned to augment the Ruhr area electrification so that by 1970 nearly 2,000 km. of lines within North Rhine Westphalia will have been included.

The German Federal Minister of Transport recently emphasised that investment in electrification in Western Germany is to be limited to D.M.350 to 400 million. The German Federal Railways electrification programme during 1964/65 requires an investment of more than D.M. one billion, to which sum the Federal provinces of North Rhine Westphalia, Niedersachsen, Bremen, and Hamburg, will grant the railway contributions with the aim of lowering the interest charges to the railway. In addition, the provinces will help the railway to secure long term loans. The relative agreement was signed between the railway and the provinces on May 19, 1961.

The electrification work in the south of Hanover portion of the North South route will presumably be finished by 1963, and electric traction is envisaged on the northern branch, Hanover-Hamburg, by the end of 1964, and on the Hanover-Bremen-Bremerhaven branch early in 1965. This will provide through-electric operation from the German North Sea coast to the south German border.

At present 1,600 km. of German Federal Railway lines are being electrified, so that after completion a total of 5,400 km. will be electrically operated—which compares with the 31,000 km. total length of the D.B. network. Later on, the main line Bremen-Osnabrück-Rhine (Emsland) is to be electrified. It is not proposed to electrify within the next ten years the Schleswig-Holstein area main lines, namely Hamburg-Kiel, Flensburg, and Hamburg-Lübeck-Fehmarn.

South African "5E1" locomotives

COMPLETION of deliveries to South African Railways of 135 Class " 5E1 " 3,000-V. d.c. locomotives was recorded in our May 26 issue. This contract, placed in 1957 with the Metropolitan-Vickers Electrical Co. Ltd., later became the responsibility of the Traction Division of Associated Electrical Industries Limited as a result of reorganistion within the group. Mechanical parts of 35 locomotives have been built under subcontract by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. While generally similar to the " 5E " class described in our September 2, 1955, issue, the " 5E1 " series has some individual features. One of these is the arrangement of the regenerative braking system so that when regenerating in parallel there are two independent excitation circuits. The object is to improve the stability effort by the suppression of a path which could permit currents to flow between the two pairs of motors in the event of the voltages regenerated across each being unequal.

Both motor-generator sets have two armature windings, which in the machine normally used for braking excitation are in parallel, while in the set which supplies the auxiliaries they are in series. Should the supply set fail, the driver can connect the exciter set windings in series so that this machine can take over the auxiliary services. As in the " 5E " class, the starting resistances are force-ventilated, but in the " 5E1 " locomotives the resistance blowers run continuously during motoring, although their speed is reduced automatically when no resistance is in circuit. The traction motors were rated originally at 550 h.p. for one hour, giving a locomotive of 2,200 h.p. as compared with the 2,000 h.p. of the first of the " 5E " class. At 550 h.p. per motor the current was 305A., and the corresponding motor speeds were 648 r.p.m. in full field and 810 r.p.m. in weak field. The high output in relation to the physical limitations imposed by the 3-ft. 6-in. gauge was made practicable by the use of glass and mica insulation treated with silicone varnish for the armature and field windings. As a rating of 2,280 h.p. is now being quoted for these locomotives, it appears that further advantage is being taken of the properties of this insulation.

On the mechanical side, the A.E.I. locomotives are characterised by the use of coil springs throughout the suspension and the absence of side bearers, the whole body weight being taken by the centre pivots. Weight is transferred from the bolsters to the bogies through coil springs carried by brackets which are hung outside the bogie frame by swing links. Horizontal traction links at axle level transmit the tractive and braking forces between bogie and bolster. These have rubber-bush attachments to their fixing lugs on the bogie frame to allow for normal swing bolster movements. Nose suspension of the traction motors is by means of the short, rubber-bushed links which have become characteristic of A.E.I. practice in electric and diesel traction. With the ability to work in multiple-unit when required, and with sufficient individual output for handling a wide range of duties unassisted, the " 5E1 " class promises to be an operating asset on all parts of the South African Railways electrified system. The contributions of the British traction industry to electric motive power in South Africa go back to the 1920's.

COURSES IN ELECTRIC TRACTION at Imperial College

Railways and Industry co-operate in the Imperial College to train future leaders in electric traction

by PROFESSOR A. JUSTIN, M.Sc., M.I.E.E., *Head, and* K. P. GRIMSHAW, B.Sc. (Eng.), A.M.I.E.E., *Lecturer, of the Department of Electrical Engineering, Imperial College of Science & Technology*

WITH the continued growth of electric traction, both at home and abroad, there will be an increasing need for young engineers who have the qualities and potential to become future leaders in electric traction applications and engineering or who wish to undertake research and development work in this field.

As a contribution toward meeting this need, the British Transport Commission and the British Electrical & Allied Manufacturers' Association last year sponsored the setting up, in Imperial College, of an academic centre for electric traction, one purpose of which was to provide special courses in electric traction for men having already had a good education and general training in electrical engineering, and commencing to specialise in this field.

The first course began in October, 1960. The purpose of this article is to say something of what is being done and of plans for the future.

Aims of the courses

It must be made quite clear that a postgraduate course in a University Engineering Department is not intended to teach the sort of practical "know-how" that a man will acquire much better in his employment. It is a continuation, in appropriate special fields, of his undergraduate studies, arising from the complete impossibility of giving students, in three years, all the basic knowledge that may be desirable for professional work in a particular field. The undergraduate course is broad, and can cover only the fundamentals common to all fields. The postgraduate year, preferably undertaken by the graduate after he has completed his industrial apprenticeship or had some practical engineering experience, still deals with fundamentals, but is narrowed to give the more thorough and advanced knowledge necessary as a basis for professional work in a selected field.

High degree of flexibility

Courses of this kind, leading to the award of the Diploma of the Imperial College (D.I.C.), have been given in the Electrical Engineering Department at Imperial College for many years for men entering such branches as communications, electric power, automatic control, and so on. The way they are organised permits a high degree of flexibility to meet the individual needs of students. In each section, a number of lecture courses and special laboratory work is provided, but all such courses, by whichever section they are organised, are potentially available to all postgraduate students and the programme of studies is planned by each student to suit his individual needs, under the guidance of his supervisor.

Thus, in electric traction, there are courses arranged by the electric traction section and, in general, attended by all the students on the electric traction course, but these are supplemented, according to individual needs, by courses in Mathematics, Statistics, Circuit Theory, Electrical Materials, and so on.

The strictly "electric traction" courses include lectures on the fundamental aspects of electromechanical energy conversion, rotary electrical machines, a wide range of static electrical devices, current collection and switching problems, interference, signalling and communications, etc., and also economic problems of transport, and mechanical and civil engineering aspects of traction.

The "supplementary" courses are quite diverse, but most of the students have been advised to include some mathematics (where postgraduate courses are conveniently arranged as short courses of 10 lectures on particular topics), an introduction to automatic control, and a course on "commutation." Contact with students specialising in other lines on this broad educational activity is beneficial.

Experimental work

An important part of the course is the experimental work. The work is arranged so as to require each student to use his initiative, and the students discuss their experimental work both with their tutors and with each other. A report on each investigation is written by the student, critically examined by the tutor and discussed with the student.

In the concluding part of the period of the course, each student is required to investigate a more difficult experimental project relevant to the future development of electric traction. During the present year these projects include investigations of commutation on a d.c. machine, of vibration of overhead lines, of stability in an exciter-generator combination, of the use of a feedback proportional to output power and of the commutation of the 100 cycles per sec. ripple current in a rectifier-fed d.c. series motor. After completing his investigation, each student writes a report which is examined and discussed. Subsequently, the student gives a short lecture to his fellow students and tutors on his experimental project and its results, and this is discussed by all the students. In this way, each student benefits from having to present his report to a friendly but critical audience and all the students on the course benefit from the interchange.

The various sections, including the electric traction section, which are responsible for the several postgraduate courses, have two further important functions. The academic staff carries out research and original work and a limited number of students is accepted to work with them on research projects to acquire experience and training in research. Such students may also participate in the regular postgraduate course, but they stay longer and are candidates for the degrees of M.Sc. and Ph.D.

There has been some difficulty in finding permanent full-time staff in the new section and, as an expedient, existing lecturing staff of the department has been supplemented by staff seconded for the purpose by the railways and by Industry on a part-time basis. This is satisfactory for the course, but less satisfactory as a basis for research. A full-time Reader and a full-time Lecturer will be appointed at the first opportunity. Nevertheless, a great deal of research work is in progress in the department that relates to electric traction. Studies are in progress on commutation, thermal ratings, the simulation of the inertia of vehicles, railway traffic control, and the combination of switched rectifiers and motors to obtain economic control of speed.

A large laboratory for heavy electrical engineering has recently been completed and, in it, work on electric traction will be stimulated by close contact with work on machines, magnetic problems and energy converters of various kinds.

Bursaries available

The courses in electric traction begin early in October each year. There are places for British students for October, 1961, and a few bursaries are available. Application should be made to the Head of the Department of Electrical Engineering, Imperial College of Science & Technology, London, S.W.7.

PRODUCTION AT PERAMBUR

The integral coach factory, Perambur, Madras, has undertaken to construct 64 electric multiple-unit coaches for the Calcutta electrification project at a cost of £11,250,000.

HIGH-SPEED TRIALS on S.N.C.F.

Attaining 118 m.p.h., 82-ton locomotive hauls 217-ton train at an average of 100 m.p.h.

THE French National Railways has announced the result of high-speed trials carried out on May 4 and 8, 1961, between Strasbourg and Mulhouse with one of its dual-frequency locomotives, the BB20103, using 25,000-V. single-phase current at a frequency of 50 cycles. The object of these trials was to run at a speed of 118 m.p.h. over as long a distance as possible. This was achieved in the afternoon of May 8 after a series of runs carried out during May 4 and on the morning of May 8 at increasing speeds.

Average of 100 m.p.h.

The 67 miles between Strasbourg and Mulhouse were covered in 40 min. 20 sec., which is equivalent to an average speed of 100 m.p.h. from start to stop, in spite of certain regulation line speed restrictions. The BB20103, which weighs only 82 tons, was hauling a train comprising five carriages of a total weight of 217 tons.

The BB20103 has two motors, each driving a twin-axle bogie, and is equipped with silicium rectifiers. It is claimed to be the most powerful engine in the world using this type of semi-conductor rectifier. It can consume either 25,000-V. single-phase current at 50 cycles (the current supplied to the Strasbourg-Mulhouse line) or 15,000-V. current at $16\frac{2}{3}$ cycles (the current used in Switzerland and in Germany).

Modifications to locomotives

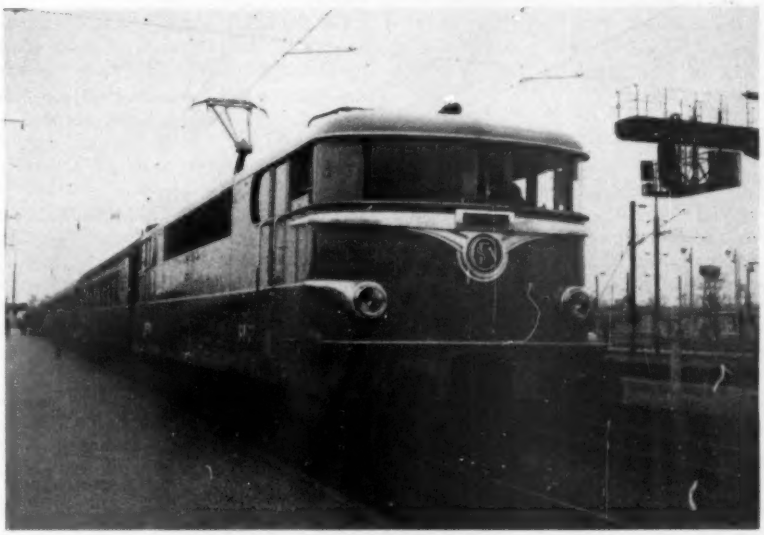
The only modifications carried out to the locomotive for these trials were as follow:—

The fixing on the AM-type pantograph used on the locomotive since it came in service in April, 1958, of a current-collecting bow of normal section with a U-shaped support giving a lower aerodynamic resistance (23 lb. at 118 m.p.h.) than the original bow with an angled support (34 lb. at the same speed).

Re-profiling of the wheel tyres.

The fixing in cab No. 2 of one of the new "Tachro" type speed recorders equipped with a dial graduated for speeds of up to 125 m.p.h., the "Flaman" recorder in cab No. 1 being limited to 105 m.p.h. This meant that cab No. 2 had to be used as the driving cab.

The test train comprised four modern stainless-steel passenger carriages of types 57, 58 and 59 with Y, 20D bogies and high-power braking, and also an electro-technical laboratory carriage, representing a total weight of 217 tons.



The train used in the trials—BB20103 dual-frequency electric locomotive on five carriages

The catenaries were not modified in any way but simply checked over by the local maintenance crews after it was decided to hold these trials. Cameras were set up at the 26-km. post, one to film the movements of the catenary at right angles to a support, the other to film the movements of three quarters of a span. They were synchronised. At certain points along the line maintenance crews in lorries were held in readiness to answer any calls made by the engineers responsible for examining the catenaries before normal traffic was resumed.

Speed of 118 m.p.h.

So far as the track was concerned, apart from the entrances to and exits from Strasbourg and Mulhouse, on May 8, a speed of 118 m.p.h. was permitted over practically the whole of the test route except when passing through Sélestat (112 m.p.h.), Colmar (93 m.p.h.), and an area of mining subsidences between kilometre posts 95·5 and 96·5 (87 m.p.h.).

All level crossings (there are 164 between Strasbourg and Mulhouse) were manned, even those with automatic half-barriers where, as an additional safety precaution, a red and white banner was strung across the road. Each level crossing was closed 5 min. before the time the test train was due to pass until 15 min. after that time. If delayed more than 10 min., the test train was to reduce speed to the normal limit for the line.

Unobstructed passage

Other trains using this line during the trial were held at stations and, where possible, on a track at a distance from that used by the test train. Members of the public and staff were not allowed on adjacent platforms.

The electrotechnical laboratory car made continuous recordings of speed, voltage, current strength, power at the pantograph, voltage, current strength and power at one of the traction motors. A meter recorded the amount of energy picked up at the pantograph.

Movements of the catenary were recorded by an oscillograph synchronised with the other instruments.

Telephonic communication was provided between the driving cab of the locomotive, instrument compartment, and

Continued on page 745

THE T.E.E.M. TRAINS of Western Europe

Stringent requirements on trains originating from 22 railways produce network of fast freight services

by G. BAUM, *Chef de Section a la Direction Generale, Swiss Federal Railways, Berne*

THE general economic situation in Western Europe, the trade agreements between the various countries and the progressive reduction of customs duties on goods exchanged between the members of the European Common Market and of the European Free Trade Association have all helped to create new streams of traffic or to increase the volume of the existing streams.

Road competition

This development was bound to have a new and beneficial impact on international transport. Competition between the traditional means of transport, rail and road, was sharpened to the point where the railways were obliged to reconsider the whole problem if they wished to retain their share of the traffic and to hold road competition in check.

The Deutsche Bundesbahn, a pioneer in this realm, had been led to modify its ideas about the routeing of goods in transit over its system. Alarmed by the increasing activity of goods vehicles on the roads, which between 1950 and 1959 had multiplied by ten the volume of import traffic, by six the volume of export traffic and by three the volume of transit traffic which they carried in Germany, the Bundesbahn introduced in May, 1960, 64 *Regelschnellgüterzüge* (regular express freight trains) and 12 *Saison* or *Bedarfschnellgüterzüge* (seasonal or special express freight trains). Thus it clearly indicated the way to give satisfaction to rail users and to face up to road competition.

The International Union of Railways (U.I.C.) had also put on its programme the study of the "Modernisation of freight transport." Its work resulted in the introduction of directives for the creation of fast long-distance rail services over the systems of several countries. By analogy with the initials T.E.E. (Trans - Europ - Express) adopted for passenger trains, the U.I.C. introduced the designation T.E.E.M. (Trans-Europ-Express-Marchandises) for freight trains.

Requirements of T.E.E.M. trains

To qualify for the appellation T.E.E.M., the new trains must conform to the following clearly-defined conditions:—

1. Their average schedule speed from forming station to destination station must be not less than 45 k.p.h.,

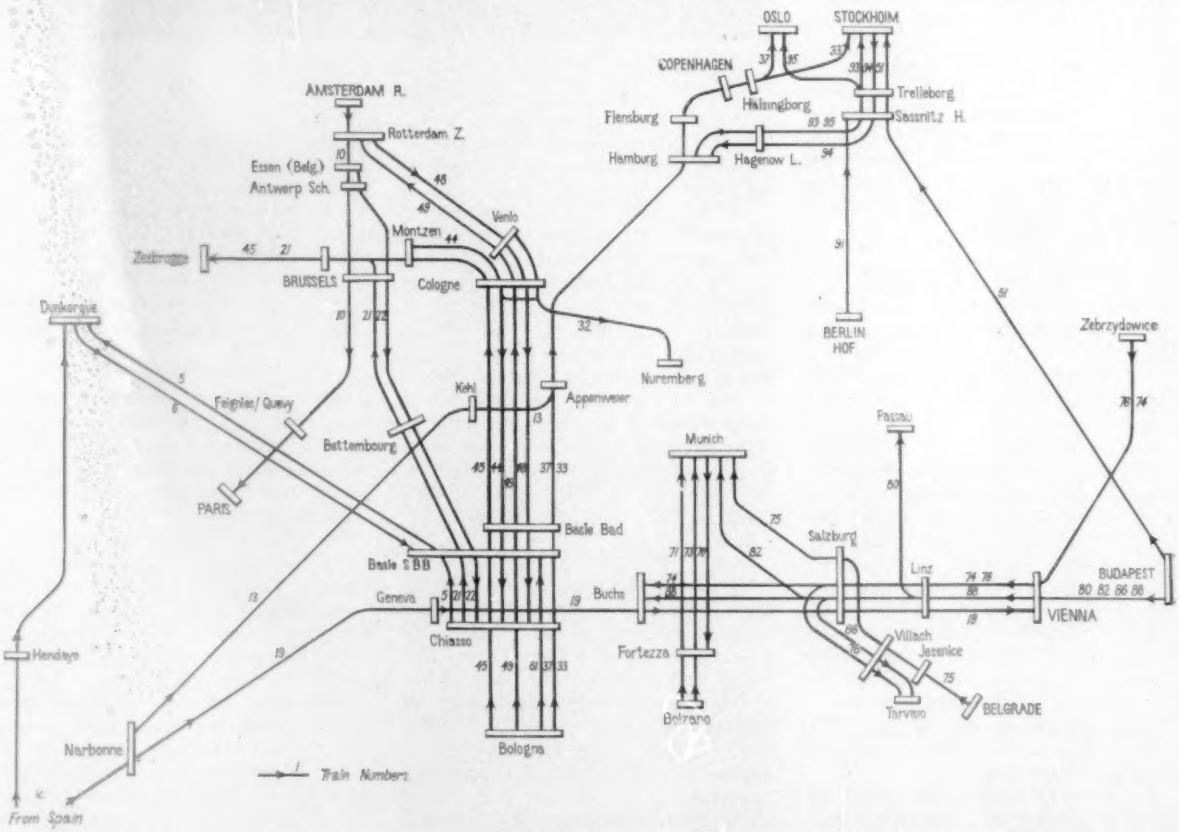


Diagram of the T.E.E.M. network, showing connections between the contributing railway systems

including stops at intermediate stations and frontier stations, with a maximum speed of 85-100 k.p.h. A tolerance is allowed for traffic using ferry services and lines with specially difficult gradients.

2. T.E.E.M. trains must comprise wagons suitable for operation at 100 k.p.h. and equipped with an adequate braking system.
3. They must operate over long distances with as simple a formation as possible and with stops of limited duration. Their running must be subject to special supervision.
4. Maximum load 1,000 tonnes, 100 axles.
5. The railway administrations are to ensure that stops at frontier stations do not exceed 2 hr.
6. T.E.E.M. trains must operate during the period shown in the time table whatever their tonnage.
7. They are to be the subject of special publicity.

Because of the variety of the origins and interchanges of the traffic, the type of freight to be transported by T.E.E.M. trains varies from country to country.

Acceptable freight

With the exception of bulk traffic, the following goods are accepted for transport by T.E.E.M. trains:—

Those requiring rapid transport;

Those which are especially subject to road competition;

Perishable goods;

provided that these are loaded in wagons complying with the required conditions (see 2 above).

It is for the railway administration of the country of origin to designate the goods which will be considered for transport by T.E.E.M. trains. The uninterrupted transport of goods subject to complicated customs procedure cannot be guaranteed.

Provision is made for designating the wagons to be incorporated in T.E.E.M. trains by providing them with a special label. The corresponding vehicle letters can also be given an appropriate distinctive sign.

Importance of publicity

It is of the highest importance that customers are accurately informed of facilities offered by T.E.E.M. trains. The publication L.I.M. (international freight train timetable) will include T.E.E.M. services in a special section.

In addition, a special T.E.E.M. booklet will be published, setting out all the services provided in a practical and uniform manner and so enabling administrations to publish separate leaflets for each service for publicity in each country.

It is worth noting that, of the 22 administrations constituting the L.I.M. Conference, the European organisation which publishes the international freight train timetables, 20 have declared themselves willing to participate in the organisations of a system of T.E.E.M. trains. Only British Railways and the Hungarian Györ-Sopron-Ebenfurt Railway Company still remain outside the T.E.E.M. system.

The timetable, which came into force on May 28, 1961, and will remain valid until May 27, 1962, provides for the running of a whole range of T.E.E.M. trains, either all the year round or during designated periods (seasonal trains), which will cross Europe in all directions as may be seen from the list of T.E.E.M. trains given below. Each service is given a number which holds throughout the run.

Service No.	*Route*
1	(Spain)-*Hendaye-Dunkirk*-(Great Britain)
5	*Chiasso*-Basle S.N.C.F.-*Dunkirk*-(Great Britain)
6	(Great Britain)-*Dunkirk-Basle S.N.C.F.*
10	*Amsterdam* - Essen - Amiens - Schaerbeck - Feignies-*Paris la Chapelle*
13	(Spain) - *Narbonne* - Dijon - Kehl - *Appenweier* - (Germany)
19	(Spain) - *Narbonne* - Geneva - Buchs SG - *Vienna*
21	(Italy) - *Chiasso* - Basle S.N.C.F. - Thionville - *Zeebrügge*-(Great Britain)
22	*Antwerp* - Stockem - Bettembourg - Thionville - Basle-*Chiasso*
32	*Venlo*-Cologne-Frankfurt (M)-*Nuremberg*
33	*Bologna* - Chiasso - Basle Bad - Flensburg - Helsingoer - Hälsingborg - *Stockholm*
37	*Bologna* - Chiasso - Basle Bad - Flensburg - Helsingoer - Hälsingborg - *Oslo*
44	*Montzen*-Aachen-Basle Bad-*Chiasso*
45	*Bologna* - Chiasso - Basle Bad - Aachen - Montzen-*Zeebrügge*
48	*Rotterdam*-Venlo-Basle Bad-*Chiasso*
49	*Bologna* - Chiasso - Basle Bad - Venlo - *Rotterdam*
51	*Budapest* - Szob - Decin - Sassnitz Hafen - Trelleborg - *Stockholm*
61	*Bologna*-Chiasso-*Basle Bad Bf*
70	*Munich*-Kufstein-Brennero-*Fortezza*
71	*Bolzano*-Brennero-Kufstein-*Munich*
73	*Bolzano*-Brennero-Kufstein-*Munich*
74	*Zebrzydowice* - Petrovice - Breclav - Vienna - *Buchs SG*
75	*Beograd* - Tesenice - Rosenbach - Salzburg-*Munich*
76	*Zebrzydowice* - Petrovice - Breclav - Vienna-Villach-*Tarvisio*
80	*Budapest*-Vienna-Linz-*Passau*
82	*Budapest*-Vienna-Linz-Salzburg-*Munich*
86	*Budapest*-Vienna-Linz-Salzburg-*Tarvisio*
88	*Budapest*-Vienna-Linz-Innsbruck-*Buchs SG*
91	*Hof*-Gutensfürst-Seddin-*Sassnitz*
93	(Hamburg) *Hagenow Land* - Sassnitz - Trelleborg - *Stockholm*
94	*Stockholm* - Trelleborg - Sassnitz - *Hagenow Land*-(Hamburg)
95	(Hamburg) - *Hagenow Land* - Sassnitz - Trelleborg-*Oslo*

This list illustrates the considerable effort which has been made by railway administrations to equip the European economy with a transport system suited to modern conceptions and capable of meeting the ever more exacting requirements of railway users.

It is probable that, aided by experience gained from operation of the 1961-62 timetable, these railway administrations will modify and improve their programme as may prove necessary. There is likewise every reason to think that more T.E.E.M. services will be developed and introduced as the need grows.

International co-operation

It is encouraging that so much emulation has been shown between the railways of the East as of the West and especially between countries on opposite sides of the iron curtain. There is no doubt that T.E.E.M. services will assist in facilitating the international exchange of goods and in bringing different types of economy closer together.

High-speed trials on S.N.C.F.

Concluded from page 743

the observation post of the electro-technical carriage. Light signals in the two cabs of the locomotive and controlled from the observation post were to be used in case of damage to the pantograph or to the catenary, to give the order to an operator in the rear cab to lower the pantograph immediately and to the driver to stop the train.

A portable accelerograph was installed in each of the cabs of the locomotive perpendicular to its axis. The vertical and the transversal forces recorded in the forward cab did not exceed 0·25 g.

Principal results

The final trial took place in the afternoon of May 8. The weather was fine, the temperature approximately 60 deg. F., and the wind fairly strong (16-19 m.p.h.) from the west. The time of departure from Strasbourg was 3.50 p.m.

The speed of 118 m.p.h. was reached on all sections of the line where it was permitted, in spite of the retarding effect of the side wind. This unfavourable factor was counteracted by using 950 V. at the motors instead of the usual 900 V. The speed was held at between 115 and 118 m.p.h. over a total distance of 37 miles.

The speed from start was raised as follows:—

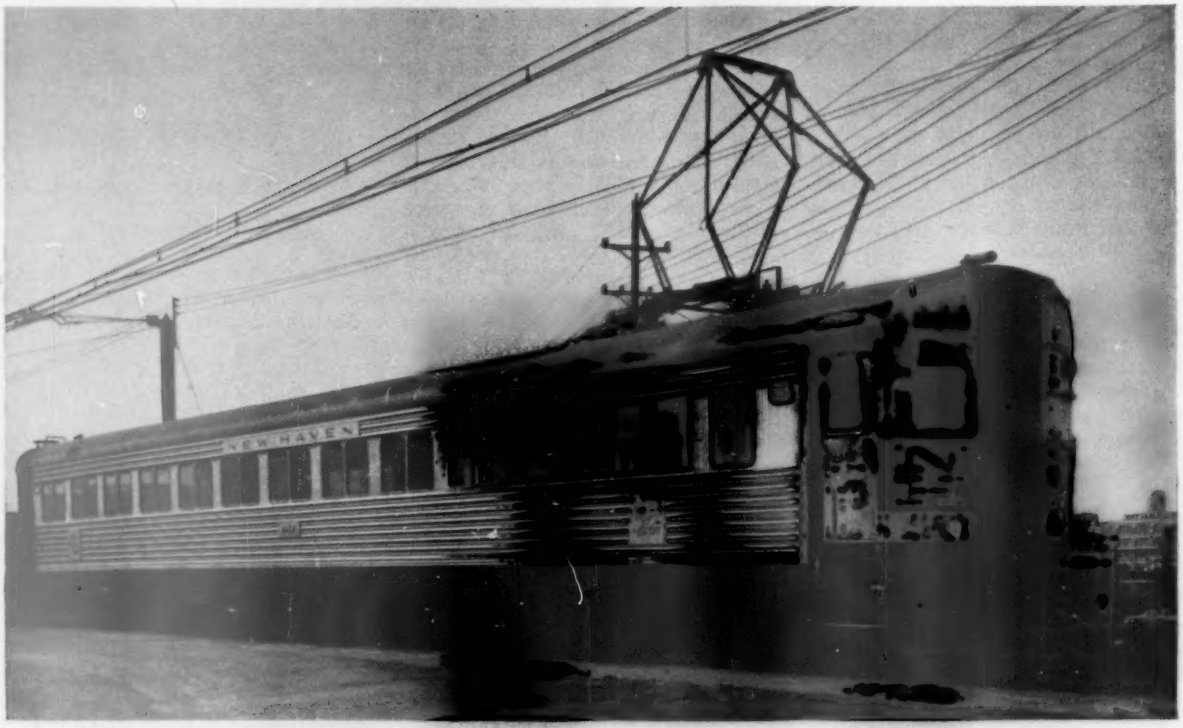
After leaving Strasbourg station at 19 m.p.h., a speed of 71 m.p.h. was reached in 56·5 sec. after travelling 1,185 yd., which is equivalent to an acceleration rate of 15¾ in. per sec. per sec. From 71 m.p.h., the speed of 118 m.p.h. was reached in 6 min. 13½ sec. after travelling approximately 10½ miles, or an acceleration rate of nearly 3 in. per sec. per sec.

Maximum power developed in starting was 6,000 kW. at the motors, or 7,500 h.p. at the wheel rim.

Consumption of energy at the pantograph of 1,440 kWh. represents an average power of 2,150 kW. at the pantograph and of 2,550 h.p. at the wheel rims.

These trials confirmed the excellent qualities of the motors and of the silicium rectifier equipment. They demonstrated the perfect behaviour at high speeds both of the BB20103 locomotive itself and of the catenary and pantograph.

The speed reached was thought to constitute an excellent performance considering that the test was made in the more difficult direction from the point of view of the profile of the line.



Coach incorporating the silicon-rectifier control and under test on the New Haven Railroad

DEVELOPMENT OF TRANSISTORISED CONTROL for commuter-type railcars

Offers increased reliability and reduces enforced idleness arising from maintenance requirements

A TRANSISTORISED control for rapid transit and commuter-type railcars has been developed by the General Electric Company of the U.S.A. and is under service test by the New Haven Railroad.

Known as the S.C.M. (simplified cam magnetic) control, the development offers increased reliability and reduces the time required for maintenance. It has been under development for the last three years.

The key feature of the system, which provides motorman-control of transit cars, is the extensive replacement by static components of interlock and relay contacts in the control circuits. Components are mounted on "plug-in" assemblies.

A reduction in main current-carrying parts has been achieved through the use of a single cam shaft-type controller. This device provides positive mechanical interlocking of the power switches mounted on it, and thereby eliminates complicated cross-interlocking.

Reliability is enhanced by the all-electric feature of the system. As all components are electrically operated, temperature variations do not affect performance.

The equipment also eliminates the need for the firing circuits and liquid cooling system required by a mercury-arc rectifier.

Tests indicate that the life expectancy of the equipment is considerably greater than the seven-year life of the ignitron tube used in mercury-arc systems.

COMMUTATOR EXCHANGE SERVICE

Under its unit-exchange scheme the General Electric Company of America is now supplying from stock overhauled commutators. The company's Locomotive & Car Equipment Department operates a repair-and-return service applicable to any commutator of its own manufacture; the exchange arrangement applies to units from GE-752, 746, and 731 motors.

The illustration shows a rebuilt commutator being checked for temperature during spin cycling. Readings are taken between hot and cold cycling done at 20 per cent higher r.p.m. and 60 per cent higher temperatures than those which occur under normal service conditions. Commutators are returned with connections fluxed and ready for soldering.

Checking a rebuilt commutator

PERSONAL

British Transport Commission

MR. S. E. RAYMOND Assistant General Manager (Traffic), British Railways, Scottish Region, who, as recorded in our June 2 issue has been appointed Traffic Adviser, British Transport Commission, joined the London Passenger Transport Board in 1946, and after holding important appointments in staff management and administration with London Transport and British Road Services, was appointed in 1955 to the Headquarters of the British Transport Commission as Assistant Manpower Adviser. He was a Member of the Board of Manage-

Mr. S. E. Raymond

ment of Pickfords from 1951 to 1955. In 1956 he became Director of Establishment & Staff, British Transport Commission, in 1957 he was appointed Chief Commercial Manager of the Scottish Region, and in 1959 he became Assistant General Manager (Traffic). During the war Mr. Raymond served in H.M. Forces overseas and was demobilised in 1946 with the rank of Lt.-Colonel.

British Railways

MR. G. A. WEEDEN, M.I.MECH.E., M.I.LOCO.E., Motive Power Officer, British Railways, Southern Region, who has been appointed Line Traffic Manager (Designate), Central Division, which will be established this autumn, was educated at West Ham Municipal College and Queen Mary College (University of London). He joined the London & North Eastern Railway as a fitter's apprentice at Stratford in 1931 and was awarded a L.N.E.R. Director's full-time scholarship. In 1937, he was awarded the first locomotive-

Mr. G. A. Weeden

running graduateship for special training in the Mechanical & Electrical Engineer's Locomotive Running and Accountant's Departments of the L.N.E.R. He received further training as Supernumerary Running Shed Foreman at Cambridge in 1939, and he was appointed Running (Shift) Foreman, Stratford, in 1942. Mr. Weeden became Locomotive Shedmaster at South Lynn in 1943; at Stockport & Heaton Mersey, under the closer working arrangements of the London Midland & Scottish and London & North Eastern Railways, in 1944; at Eastfield, Glasgow, in 1944, and at Kings Cross in 1947. In 1949 he was appointed Assistant District Motive Power Superintendent, Stratford, British Railways, Eastern Region, and in June, 1952 Assistant to Motive Power Superintendent (Mechanical), British Railways, Southern Region. In September 1955 he became District Motive Power Superintendent, Stewarts Lane, and in January 1958, Acting Assistant Motive Power Superintendent. He was appointed Motive Power Officer in the Traffic Department, Southern Region, in October 1958.

MR. H. NUNN, Head of Contracts & Statistics Section, Chief Civil Engineer's Department, London Transport Executive, has been appointed Principal Executive Assistant, Chief Civil Engineer's Department.

MR. R. S. JONES, Stationmaster, Willerby, British Railways, North Eastern Region, has been appointed Stationmaster, Market Weighton.

MR. F. P. B. TAYLOR, M.INST.T., Commercial Officer, British Railways, Southern Region, who has been appointed Line Traffic Manager (Designate), South Western Division, which will be established this autumn, was educated at Churcher's College, Petersfield, and joined the Southern Railway at Leatherhead Station in 1928. He was selected as a Cadet in 1929 and had four years training in all departments, followed by further experience in the Docks & Marine Department, Southampton, and in the Development Section of the Traffic Department, Waterloo. In 1937, Mr. Taylor was appointed to the Business Systems Section (Office Methods, Mechanisation & Equipment) of the General Manager's Office. In 1942, he was Chief of the Air Raid Precaution Section and, in the following year, Chief of the General Section. In 1946, he was appointed Assistant (Services & Finance) and also occupied the position of Secretary at the

Mr. F. P. B. Taylor

Traffic Officer's Conference. Mr. Taylor became General Assistant to the Commercial Officer in 1958, and Commercial Officer in 1959.

MR. J. D. WEST, Assistant Engineer (Bridges), Chief Civil Engineer's Department, Kings Cross, British Railways, Eastern Region, has been appointed Assistant Civil Engineer (Modernisation). MR. H. WYLES, Bridge Assistant, Chief Civil Engineer's Department, Euston, British Railways, London Midland Region, has been appointed Assistant Engineer (Bridges), at Kings Cross in place of Mr. West.

MR. R. E. EVANS, B.SC.(ENG.), A.M.I.C.E., District Engineer, Ipswich, British Railways, Eastern Region, who has been appointed District Engineer, Stratford, began his railway career in 1933 on the former L.M.S. in the Chief Civil Engineer's Office at Euston. In 1936 he transferred to the District Engineer's Office, Watford. From 1939 to 1946 Mr. Evans served with the Royal Engineers in India and the Middle East,

Mr. R. E. Evans

and for the three last years commanded a Railway Construction Company with the rank of Major R.E. After demobilisation he returned to Watford, and, in 1947, was appointed Outdoor Engineering Assistant at Crewe. In 1950 he became Senior Assistant in the Maintenance Section of the Civil Engineer's Office at Kings Cross, Eastern Region. A year later he was appointed Senior Technical Assistant in the District Engineer's Office, Doncaster. His appointment as Assistant District Engineer, Cambridge, took place in May, 1953, and, in 1955, he transferred to Peterborough in a similar capacity. He was appointed District Engineer, Ipswich, in 1956.

MR. R. B. REID, Assistant District Goods Manager, Glasgow, British Railways, Scottish Region, who, as recorded in our June 23 issue, has been appointed District Passenger Manager, Glasgow & South West Division, was educated at Malvern College and Oxford and joined the London & North Eastern Railway as a Traffic Apprentice at Banchory in 1947. After special training in Scotland he served in the Operating Superintendent's Office, Edinburgh, until transferring to the General Manager's Office, York, in 1953. In 1957 Mr. Reid went to Leeds as Head of Rates & Development, District Goods Superintendent's Office and a year later he became Goods Agent, York. Last year he returned to Scotland as Assistant District Goods Manager, Glasgow.

The London Midland Region of British Railways has announced the following appointments : MR. W. T. JONES to be Goods Agent, Curzon Street, Birmingham; MR. M. E. REDHEAD to be Stationmaster, Liverpool Exchange, and MR. G. SIMPSON to be Passenger Agent, Euston.

Institution of Locomotive Engineers

MR. J. F. HARRISON, M.I.MECH.E., M.I.LOCO.E., Chief Mechanical Engineer, British Railways

Mr. J. F. Harrison

Mr. R. B. Reid

Central Staff, British Transport Commission, who, as recorded in our issue of May 19, was President Elect of the Institution of Locomotive Engineers, and who has now taken office, was educated at Malvern Wells and Wellington College. He joined the former Great Northern Railway in 1921 and became a pupil at Doncaster Works. He was Supernumerary Foreman in the Locomotive Running Department of the former L.N.E.R. at Doncaster and later at Kings Cross. He became Running Shed Foreman in charge of Wigan and St. Helens in 1926; Technical Assistant to the Locomotive Running Superintendent at Liverpool Street in 1929; Assistant to Locomotive Works Manager, Gorton, in 1930; Assistant Locomotive Works Manager, Doncaster, in 1937; Locomotive Works Manager, Gorton, in 1938; Mechanical Engineer, Gorton, in 1941; Mechanical Engineer, Cowlairs, in 1945; Assistant Chief Mechanical Engineer at Doncaster in 1947; Mechanical & Electrical Engineer, Eastern & North Eastern Regions, in 1950, and in 1951, Mechanical & Electrical Engineer, London Midland Region. Mr. Harrison was appointed Chief Mechanical Engineer, British Railways Central Staff, British Transport Commission, in 1958.

Overseas

LORD CLITHEROE has been elected to the board of the Benguela Railway Company.

MR. R. K. INNES, General Manager, Nigerian Railway Corporation has retired.

MR. J. W. G. MACDOUGALL, Commission Counsel, Canadian National Railways, has been appointed General Solicitor.

MR. S. S. CHAMBERS, Assistant to the General Manager, Ottawa, Canadian National Railways, has been appointed Manager, Canadian National Hotels Limited. He succeeds MR. R. SOMMERVILLE who has retired.

Obituary

We regret to record the death, at the age of 69, of SIR HENRY WILLIAM HUGH WARREN, who was Managing Director of Associated Electrical Industries Limited, from 1948-54.

We regret to record the death, on June 18, at the age of 64, of MR. G. F. SINCLAIR, Deputy Chairman of the Board of Management of British Road Services. Mr. Sinclair trained with Dick, Kerr & Co. Ltd., and later joined the English Electric Co. Ltd. He became General Manager of the Kilmarnock Engineering Co. Ltd., in 1926, and joined the London County Council Tramways, in 1930, as Assistant Rolling Stock Engineer, becoming Rolling Stock Engineer in 1931. He was appointed Chief Engineer (Trams & Buses) with the London Passenger Transport Board in 1939. Mr. Sinclair became Deputy General Manager (Road Services), L.P.T.B. in 1945, and Chief Technical Planning & Supplies Officer, London Transport Executive in 1947. He became a member of the Road Haulage Executive in 1950 and Deputy Chairman of British Road Services in 1959.

Mr. G. F. Sinclair

NEW EQUIPMENT *and Processes*

150-TON BREAKDOWN CRANE

Two large breakdown cranes were ordered by the Quebec Cartier Mining Company in 1960. The larger of these, of 250 short tons capacity, was illustrated and described on page 650 of our issue of December 2, 1960. The smaller, has now been delivered and has many features in common with the bigger crane in that it runs on 4-ft. 8½-in. gauge, has main and auxiliary hoists, is mounted on six-wheeled bogies, and is diesel-hydraulic. Operating conditions and structure gauge are the same.

The maximum axle-load in running order, with jib suspended and blocks supported upon a matchtruck is 25 tons, whilst the maximum lifting capacity, with outriggers set, is 150 tons at 17-ft. 6-in. radius, on the main hook. This figure does not require deduction of the weight of the blocks and hook, and minimum reserve stability is 17 per cent. Length over headstocks is 36 ft. 1½ in., coupled length is 39 ft. 6 in. and axles are spaced at 5 ft. 0 in. centres.

Fitted with a Rolls-Royce six-cylinder vertical liquid-cooled normally aspirated diesel engine, rated at 179 b.h.p., the crane will lift 150 tons at 6½ ft./min. and 56 tons at 20 ft./min. on the auxiliary hoist. The full load may be slewed through 360 deg. in two minutes and the jib derricked in from running height to minimum radius in approximately the same time. Rated loads are derricked from maximum to minimum radius at 15 ft. per minute, whilst the crane will travel with a load of 28 tons upon the hook up a straight 2½ per cent grade, at 130 ft. per minute, or, on the level, at 260 ft. per minute.

The Rolls-Royce/Twin-Disc hydraulic torque converter, mounted upon the main engine, drives the crane machinery through an epicyclic reverse-gearbox, enclosed spiral bevel-gears and cardan-shafts.

The ramshorn main hook is carried on eight falls, and the trapezoidal auxiliary hook on four falls. Ropes are coiled upon cast-steel barrels, and gearing is arranged in conjunction with the torque-converter to provide automatically increased speeds with reduction in load. A separate positive multi-jaw clutch and brake is provided for each hoist.

The swan-neck jib is of welded box-construction, built up from alloy-steel plate, due to its exposed position and to obviate brittle-fracture.

Further details can be obtained from Cowans, Sheldon & Co. Ltd., St. Nicholas Works, Carlisle.

SCLEROSCOPE

The new Shore Scleroscope Model C.2 is an improved, direct-reading instrument, simple and fast in use for the testing of thin metal sheets such as hardened steel (from 0·006 in. thickness), cold rolled unannealed brass and steel (from 0·010 in.), and annealed sheets (from 0·015 in. thickness).

It is also suitable for the testing of chilled iron, forged rolls, gears, axles and other machined parts.

The advantage for industrial production, particularly where finished polished surfaces are concerned, is that the diamond hammer used leaves no impression visible to the naked eye even on strip with a mirror finish.

Further details can be obtained from Griffin & George (Sales) Limited, Ealing Road, Alperton, Wembley, Middlesex.

SECTIONAL BUILDINGS

A new type of sectional timber building has an outer covering of ¼ in. Douglas Fir plywood, instead of the traditional weatherboard or shiplap cladding.

The use of external quality, resin-bonded plywood cladding eliminates the possibility of draughts and leakage caused by shrinkage or knot-holes.

Besides possessing a pleasing appearance, these buildings are easy to erect and dismantle. The 15 deg. pitch roof covered with two-ply bituminous felt, is supported on trusses of T.D.A. approved design. Standard spans are 20 ft., 25 ft. and 30 ft., with lengths varying from 40 ft. to 80 ft. in 10 ft. increments.

Further details can be obtained from Middlesex Prefabricated Buildings Limited, Green Lane, Hounslow, Middlesex.

ALUMINIUM-BACKED TAPE

Standard Sylglas is a textile fabric impregnated and coated with a compound rendering it impervious to water. A new material has been introduced, which is similar in character to standard Sylglas but incorporates a glass-fibre carrier for the compound and is backed by aluminium foil. Known as Aluminium Sylglas this new material may be left in its original state or painted.

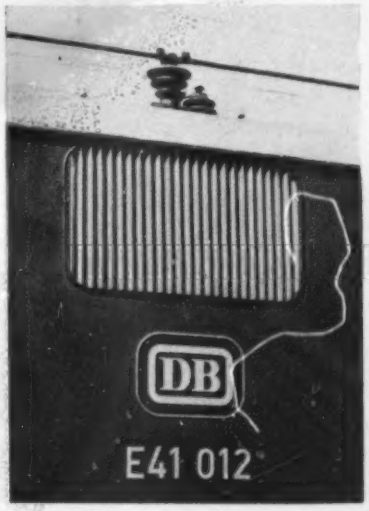
Further details can be obtained from the Sylglas Company, 81 Knight's Hill, London, S.E.27.

AIR-INTAKE LOUVRES

It has been estimated that the removal of dirt amounts to a quarter of the cost of maintaining diesel and electric locomotives. In these circumstances much trouble has been taken by the German Federal Railways to co-operate in the production of a filter capable of introducing into the interior of diesel and electric locomotives air which is free from dust, water, or snow.

A multi-nozzle air intake louvre has been developed with an overall depth of only 2 $\frac{7}{16}$ in., the pressure drop of which amounts to only ½–$\frac{11}{16}$ in. of water gauge.

Further details can be obtained from Orthos (Engineering) Limited, 62 Coventry Road, Market Harborough, Leicestershire.



VAN-MOUNTED COMPRESSOR

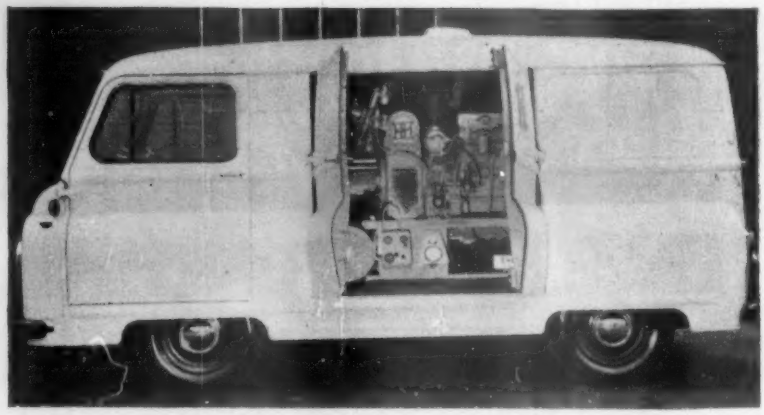
The Rotair 150 compressor is available in a variety of vehicles and constitutes a useful mobile source of compressed air.

The compressor, powered by a Ford industrial diesel engine, produces 150 cu. ft. of air a minute at a pressure of 100 lb. sq. in.

The compressor engine is fitted with two silencers in tandem with the outlet under the van floor. Mechanical noise is said to be substantially reduced by the van body and could be reduced still further by insulation.

The compressor is easily removed should this be necessary.

Further details can be obtained from Holman Bros. Ltd., Camborne, Cornwall.



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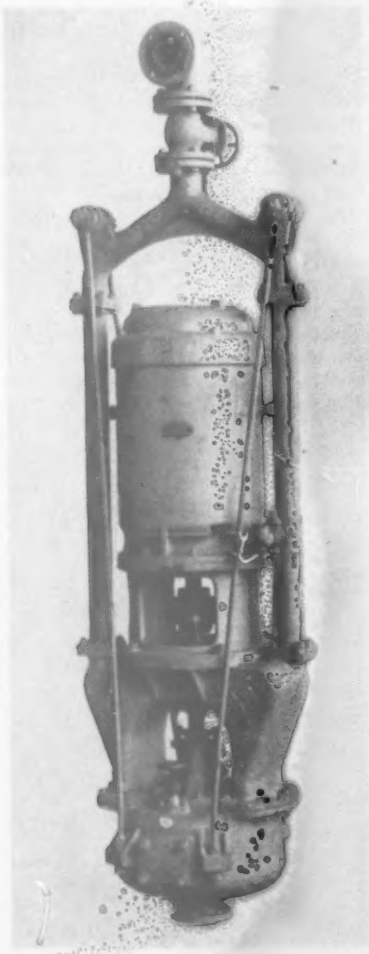
New versions of a range of electrically-operated vertical-spindle self-priming pumps are in production. These pumps, which are for sub-level operation, incorporate spheroidal graphite iron, to eliminate electrolytic effects arising from the use of dissimilar metal for such parts as impellers and wearing plates.



The capacities of the range extend from that of the 2 in. unit which has an output of 6,000 g.p.h. against a total head from all causes of 90 ft. and 4,000 g.p.h. at 100 ft., to that of the 6 in. pump which handles 50,000 g.p.h. at 70 ft. total head and 30,000 g.p.h. at a 90 ft. total head.

Further details can be obtained from Henry Sykes Limited, 53b Southwark Street, London, S.E.1.

P.V.C. PIPING

A medium-impact rigid p.v.c. pressure pipe is being marketed under the trade name of "Aspect." It is made in sizes from 1 to 6 in. dia. in three classes, suitable for working heads of 200, 300 and 400 ft., and with a wide range of fittings.

The pipe is recommended by the maker for water mains, chemical process piping and waste drainage, oil and natural gas piping, air conditioning installations, water filtration plant and electrical conduit. It is unaffected by salt water, demineralised water and chlorinated water. It is particularly suitable where ground movement is to be expected. P.v.c. piping is resistant to corrosive soils and to a wide range of chemical compounds, it has a smooth internal surface and high flow capacity, and is light and easy to handle. Installed costs are low—from 17s. 6d. to 25s. 6d. per yard for 3 in. main suitable for a working head of 200 ft.

Further details can be obtained from the Universal Asbestos Manufacturing Co. Ltd., Tolpits, Watford, Herts.

SYNTHETIC MATERIAL

A new elastic material, known as Ulon, is available in various grades, with a stiffness ranging from that of soft rubber to one sufficiently hard to replace cast-iron gears, metal bearings, and so on. The material may be considered wherever there is a high rate of wear and tear, or other cost-consuming factors. Abrasion resistance is said to be considerably above that of steel.

Further details can be obtained from Unitex Limited, Knaresborough, Yorkshire.

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A symbol printer has been produced which, when used with the maker's existing "X" & "Y" co-ordinate plotting table, allows plotting of various identifiable-point plotted curves on one chart. It can be incorporated in data plotting systems from punched card, punched tape, or point plotter.

In operation the imprint of a selected symbol is accomplished by a solenoid-actuated die through an inked ribbon. Dies are inserted manually into the printing unit and once in position the operation is automatic from the actuating source.

Accuracy is stated to be within the overall accuracy of the co-ordinate plotting table. Actuating power is provided internally by the table. Plotting rate is a maximum of 60 points a minute.

The symbol printer is easily fitted to the co-ordinate plotting table. As it uses a standard typewriter ribbon there is no difficulty in obtaining replacements.

Further details can be obtained from Bryans Aeroquipment Limited, Willow Lane, Mitcham, Surrey.

PLUGS & SOCKETS

A range of crimpable plugs and sockets has been introduced, with housings manufactured from either phenolic or diallyl phthalate. They are available in 14, 20, 21, 26, 34, 41, 50, 75 and 104 positions.

The contacts have a gold-over-nickel finish and are designed for crimping either with an automatic machine or a hand tool.

The contacts are easily inserted and extracted, which are valuable features on prototype equipment.

Further details can be obtained from Aircraft Marine Products (GB) Limited, 87 Saffron Hill, London, E.C.1.

Civil Engineers' conversazione

The Institution of Civil Engineers held a conversazione at its headquarters, Storeys Gate, London, S.W.1, on June 21. Among the engineering models and examples of scientific apparatus exhibited, were some of railway interest.

A new method of fastening flat-bottom rails on concrete sleepers was shown by Mr. M. G. R. Smith, Chief Civil Engineer, Western Region, British Railways. It consists of a bar of D-section, located through two hooks, and works on the principle of a cam which enables a clip to be tensioned.

A model of a sectional plate-girder railway bridge was exhibited by Mr. R. A. Foulkes and Mr. C. Longbottom, Military Engineering Experimental Establishment. This is designed to carry 20 units of R.A.1 loading at 40 m.p.h., and to provide spans which can be varied from 35 ft. to 70 ft.

A road-rail interport was displayed by Messrs. Brian Colquhoun & Partners and was an exhibit of Mitchell Engineering Limited. The method basically consists of a saw-tooth platform layout, associated with a series of swing tables, each carrying a length of rail appropriate to the length of a wagon. In operation a train is driven between the platforms, with the swing tables in line. The tables are then simultaneously swung into echelon, and the wagons automatically uncoupled. Each wagon then has both ends presented to a section of platform and can be loaded or unloaded with road vehicles.

Doncaster Works Power supply

In 1949 the introduction of new machines increased the demand for electricity beyond the capacity of the source of supply at Doncaster Works on the Eastern Region of British Railways and this was supplemented by power from the local electricity authority.

By 1957 the main-plant works at Doncaster was taking all the electricity from this last source, leaving the colliery service, the original supplier, to provide power for the wagon works, marshalling yard and locomotive depot only.

Continued increases in demand, together with other factors, necessitated the preparation of a scheme for the complete abandonment of the colliery service and the connection of the wagon works to the electrical service in the plant works. A scheme was devised by the Chief Mechanical and Electrical Engineer of the Eastern Region which would enable the change-over to be carried out without interruption to railway services in the area concerned.

This entailed the re-routing of approximately 800 yds. of existing e.h.v. cables in the plant works, and the provision of an outdoor type substation. This was achieved by cutting the existing e.h.v. cables and diverting these to enable a ring main unit to be established.

Approximately three miles of new e.h.v. cable was installed between the plant works and the wagon works as part of the scheme. At the wagon works the existing substation was completely stripped and reconstructed. A 1,500 kVa. transformer, a 300 kW. rectifier, e.h.v. switchgear, and a main switchboard were installed in the reconstructed substation and several submain switchboards were installed in the wagon works.

A new substation was established at the Road Van Shop to assist in the satisfactory distribution of the available electrical energy.

The electrical work was carried out by Crompton Parkinson Limited under the supervision of Mr. T. C. B. Miller, Chief Mechanical & Electrical Engineer, British Railways, Eastern Region. The civil engineering work was arranged and supervised by Mr. A. K. Terris, Chief Civil Engineer, British Railways, Eastern Region.

G. A. Harvey & Co. (London) Ltd.

A new head sales office and showroom, G. A. Harvey & Co. (London) Ltd., in Villiers House, London, W.C.2, was opened on June 26, by Mr. Paul Reilly, Director of the Council of Industrial Design. The office and showroom are on the first floor of a modern office building and have an area of 6,500 sq. ft. In the showroom are many items from the Harvey and Harvey-Milner ranges of steel office furniture and partitioning, and in the reception area are coloured transparencies showing examples of production from Harveys' other departments which include heavy fabrication, light fabrication, sheet metalwork, metal perforation, wirework and weaving and galvanising.

Branch offices and showrooms of similar style, each of about 1,200 sq. ft. in area, have been opened recently in Bristol, Leeds and Glasgow and three more will be opened in July in Manchester, Liverpool and Birmingham. All provincial offices are linked with Villiers House and with the works at Greenwich by Telex communication.

Headquarters for British Railways research

Engineering laboratories to be built by British Railways at Derby at a cost of about £1½ million will be equipped with the most advanced apparatus in Britain for testing carriage and wagon underframes, bridge sections, reinforced concrete units, and other heavy railway equipment. Building is expected to begin in August and will take about two years to complete.

This project is part of a comprehensive scheme to reorganise and expand the British Railways Research Department, the first stage of which was completed last year with the opening of chemical laboratories at Muswell Hill, London.

Under this scheme, the engineering, vehicle and track, metallurgy, and physics divisions are being combined and housed at Derby. The buildings will also become the headquarters of the Director of Research, whose present office is in London.

The buildings have been designed by the Commission's architect, Dr. F. F. C. Curtis. They will be situated in London Road immediately opposite the present engineering laboratories built by the London Midland & Scottish Railway in 1931. They will have all the facilities of the existing accommodation but on a much larger scale, thus reducing overcrowding necessitated by the need for more staff and the housing of additional equipment. The older buildings will be released for use of the Area Chemical Services which are at present located in inadequate premises elsewhere in the town.

The main building in the group is a large test hall. This is linked by the stores to three wings of single-storey laboratories which, together with a five-storey building containing scientists' study rooms, library and administrative offices, enclose a paved and landscaped quadrangle. Elsewhere on the site will be a garage for mobile test vehicles, cottages for caretaker and maintenance superintendent, and a section of the site trackwork which will be set at a steep gradient for wagon buffer tests.

The single-storey laboratories, which will be built in reinforced concrete—largely precast—will have mullions at 6 ft. intervals. The main services—electricity, gas, water and heating—will be conducted through "man-high" ducts giving easy access to the service engineers when modifications in the supply are required.

This section will contain a wide range of laboratories equipped for the study of physics, heat, acoustics, light, metallurgy and metalography. There will also be instrumentation and photographic laboratories, a drawing office, and special rooms for computers.

Testing Equipment

The large test hall will include a heavy dynamic fatigue-testing installation for experiments with bridge girders, underframes and concrete units, a static 250-ton compression machine for testing carriage underframes, and vehicle inspection pits. It will also contain a special area where tests on small components can be carried out, a stores room and a workshop.

Next to the length of railway track will be a small laboratory for recording the result of the wagon buffer tests. The windows of this building will be protected by armour plate to prevent risk of injury to the research staff from stray fragments from wagons caused by heavy impact with the buffers.

The laboratories and offices will be heated by an oil-fired installation and the chimney of the boilerhouse will be clad with aluminium to reduce maintenance costs. For the same reason, mosaic cladding will be used on the exteriors of most of the buildings.

Room will be provided for expansion of the present computer activities to cover additional technical problems.

Applied research department of Alfred Herbert Limited

The applied research department of Alfred Herbert Limited, to which editorial reference was made last week, was officially opened by the Rt. Hon. Reginald Maudling, M.P., President of the Board of Trade.

The programme of the applied research department is broadly divided in two main groups; research into the fundamental problems of the machine tool maker, and a general study of the economic production of materials and components.

The main building is divided in two bays, one of which is equipped as a machine shop for the manufacture of machines, jigs, fixtures, and test components. The second

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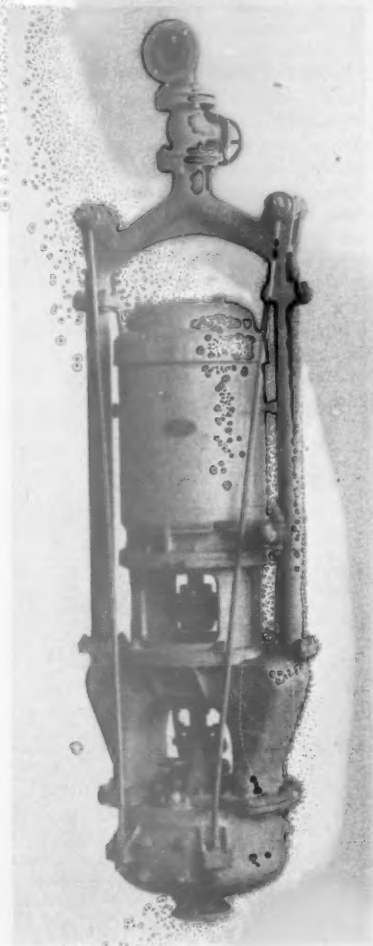

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A symbol printer has been produced which, when used with the maker's existing "X" & "Y" co-ordinate plotting table, allows plotting of various identifiable-point plotted curves on one chart. It can be incorporated in data plotting systems from punched card, punched tape, or point plotter.

In operation the imprint of a selected symbol is accomplished by a solenoid-actuated die through an inked ribbon. Dies are inserted manually into the printing unit and once in position the operation is automatic from the actuating source.

Accuracy is stated to be within the overall accuracy of the co-ordinate plotting table. Actuating power is provided internally by the table. Plotting rate is a maximum of 60 points a minute.

The symbol printer is easily fitted to the co-ordinate plotting table. As it uses a standard typewriter ribbon there is no difficulty in obtaining replacements.

Further details can be obtained from Bryans Aeroquipment Limited, Willow Lane, Mitcham, Surrey.

PLUGS & SOCKETS

A range of crimpable plugs and sockets has been introduced, with housings manufactured from either phenolic or diallyl phthalate. They are available in 14, 20, 21, 26, 34, 41, 50, 75 and 104 positions.

The contacts have a gold-over-nickel finish and are designed for crimping either with an automatic machine or a hand tool.

The contacts are easily inserted and extracted, which are valuable features on prototype equipment.

Further details can be obtained from Aircraft Marine Products (GB) Limited, 87 Saffron Hill, London, E.C.1.

Civil Engineers' conversazione

The Institution of Civil Engineers held a conversazione at its headquarters, Storeys Gate, London, S.W.1, on June 21. Among the engineering models and examples of scientific apparatus exhibited, were some of railway interest.

A new method of fastening flat-bottom rails on concrete sleepers was shown by Mr. M. G. R. Smith, Chief Civil Engineer, Western Region, British Railways. It consists of a bar of D-section, located through two hooks, and works on the principle of a cam which enables a clip to be tensioned.

A model of a sectional plate-girder railway bridge was exhibited by Mr. R. A. Foulkes and Mr. C. Longbottom, Military Engineering Experimental Establishment. This is designed to carry 20 units of R.A.1 loading at 40 m.p.h., and to provide spans which can be varied from 35 ft. to 70 ft.

A road-rail interport was displayed by Messrs. Brian Colquhoun & Partners and was an exhibit of Mitchell Engineering Limited. The method basically consists of a saw-tooth platform layout, associated with a series of swing tables, each carrying a length of rail appropriate to the length of a wagon. In operation a train is driven between the platforms, with the swing tables in line. The tables are then simultaneously swung into echelon, and the wagons automatically uncoupled. Each wagon then has both ends presented to a section of platform and can be loaded or unloaded with road vehicles.

Doncaster Works Power supply

In 1949 the introduction of new machines increased the demand for electricity beyond the capacity of the source of supply at Doncaster Works on the Eastern Region of British Railways and this was supplemented by power from the local electricity authority.

By 1957 the main-plant works at Doncaster was taking all the electricity from this last source, leaving the colliery service, the original supplier, to provide power for the wagon works, marshalling yard and locomotive depot only.

Continued increases in demand, together with other factors, necessitated the preparation of a scheme for the complete abandonment of the colliery service and the connection of the wagon works to the electrical service in the plant works. A scheme was devised by the Chief Mechanical and Electrical Engineer of the Eastern Region which would enable the change-over to be carried out without interruption to railway services in the area concerned.

This entailed the re-routing of approximately 800 yds. of existing e.h.v. cables in the plant works, and the provision of an outdoor type substation. This was achieved by cutting the existing e.h.v. cables and diverting these to enable a ring main unit to be established.

Approximately three miles of new e.h.v. cable was installed between the plant works and the wagon works as part of the scheme. At the wagon works the existing substation was completely stripped and reconstructed. A 1,500 kVa. transformer, a 300 kW. rectifier, e.h.v. switchgear, and a main switchboard were installed in the reconstructed substation and several submain switchboards were installed in the wagon works.

A new substation was established at the Road Van Shop to assist in the satisfactory distribution of the available electrical energy.

The electrical work was carried out by Crompton Parkinson Limited under the supervision of Mr. T. C. B. Miller, Chief Mechanical & Electrical Engineer, British Railways, Eastern Region. The civil engineering work was arranged and supervised by Mr. A. K. Terris, Chief Civil Engineer, British Railways, Eastern Region.

G. A. Harvey & Co. (London) Ltd.

A new head sales office and showroom, G. A. Harvey & Co. (London) Ltd., in Villiers House, London, W.C.2, was opened on June 26, by Mr. Paul Reilly, Director of the Council of Industrial Design. The office and showroom are on the first floor of a modern office building and have an area of 6,500 sq. ft. In the showroom are many items from the Harvey and Harvey-Milner ranges of steel office furniture and partitioning, and in the reception area are coloured transparencies showing examples of production from Harveys' other departments which include heavy fabrication, light fabrication, sheet metalwork, metal perforation, wirework and weaving and galvanising.

Branch offices and showrooms of similar style, each of about 1,200 sq. ft. in area, have been opened recently in Bristol, Leeds and Glasgow and three more will be opened in July in Manchester, Liverpool and Birmingham. All provincial offices are linked with Villiers House and with the works at Greenwich by Telex communication.

Headquarters for British Railways research

Engineering laboratories to be built by British Railways at Derby at a cost of about £1¼ million will be equipped with the most advanced apparatus in Britain for testing carriage and wagon underframes, bridge sections, reinforced concrete units, and other heavy railway equipment. Building is expected to begin in August and will take about two years to complete.

This project is part of a comprehensive scheme to reorganise and expand the British Railways Research Department, the first stage of which was completed last year with the opening of chemical laboratories at Muswell Hill, London.

Under this scheme, the engineering, vehicle and track, metallurgy, and physics divisions are being combined and housed at Derby. The buildings will also become the headquarters of the Director of Research, whose present office is in London.

The buildings have been designed by the Commission's architect, Dr. F. F. C. Curtis. They will be situated in London Road immediately opposite the present engineering laboratories built by the London Midland & Scottish Railway in 1931. They will have all the facilities of the existing accommodation but on a much larger scale, thus reducing overcrowding necessitated by the need for more staff and the housing of additional equipment. The older buildings will be released for use of the Area Chemical Services which are at present located in inadequate premises elsewhere in the town.

The main building in the group is a large test hall. This is linked by the stores to three wings of single-storey laboratories which, together with a five-storey building containing scientists' study rooms, library and administrative offices, enclose a paved and landscaped quadrangle. Elsewhere on the site will be a garage for mobile test vehicles, cottages for caretaker and maintenance superintendent, and a section of the site trackwork which will be set at a steep gradient for wagon buffer tests.

The single-storey laboratories, which will be built in reinforced concrete—largely precast—will have mullions at 6 ft. intervals. The main services—electricity, gas, water and heating—will be conducted through "manhigh" ducts giving easy access to the service engineers when modifications in the supply are required.

This section will contain a wide range of laboratories equipped for the study of physics, heat, acoustics, light, metallurgy and metalography. There will also be instrumentation and photographic laboratories, a drawing office, and special rooms for computers.

Testing Equipment

The large test hall will include a heavy dynamic fatigue-testing installation for experiments with bridge girders, underframes and concrete units, a static 250-ton compression machine for testing carriage underframes, and vehicle inspection pits. It will also contain a special area where tests on small components can be carried out, a stores room and a workshop.

Next to the length of railway track will be a small laboratory for recording the result of the wagon buffer tests. The windows of this building will be protected by armour plate to prevent risk of injury to the research staff from stray fragments from wagons caused by heavy impact with the buffers.

The laboratories and offices will be heated by an oil-fired installation and the chimney of the boilerhouse will be clad with aluminium to reduce maintenance costs. For the same reason, mosaic cladding will be used on the exteriors of most of the buildings.

Room will be provided for expansion of the present computer activities to cover additional technical problems.

Applied research department of Alfred Herbert Limited

The applied research department of Alfred Herbert Limited, to which editorial reference was made last week, was officially opened by the Rt. Hon. Reginald Maudling, M.P., President of the Board of Trade.

The programme of the applied research department is broadly divided in two main groups; research into the fundamental problems of the machine tool maker, and a general study of the economic production of materials and components.

The main building is divided in two bays, one of which is equipped as a machine shop for the manufacture of machines, jigs, fixtures, and test components. The second

bay is arranged for the building and development testing of the prototype machines. Machines under test are mounted on accurately levelled, deep-steel joists embedded in the concrete floor, and for the precision testing of sensitive machines an insulated concrete raft is used.

At the end of the building is an electrical laboratory and office accommodation for the mechanical and electrical research engineers. Covered channels in the floor permit remote-reading instruments and electrical equipment to be connected to the machines or rigs under test.

The laboratory is equipped with instrumentation for a wide range of precision measurement, using the latest techniques for wave-form analysis, high-speed counting and timing, process measurement and control, and thermal problem investigations.

Guests at the opening ceremony were allowed to inspect much of the research work in progress. Examples of projects concerned with the development of standard-type machines include the pre-loading and lubrication of bearings, rigidity of machine beds and spindles, gear tooth wear, compressed air lubrication of machine slides, and thermal expansion problems. On product development much attention is being given to electrical and electronic control systems using punched card and magnetic tape programming units.

Presentation to Mr. Louis Armand

At a ceremony on June 20 at the UNESCO Palace in Paris Mr. Louis Armand, Secretary-General of the International Union of Railways, who was recently elected a member of the Académie des Sciences Morales et Politiques, was presented with a sword, by Mr. René Cassin, Honorary Chairman of the Conseil d'Etat.

Among the guests were: Mr. John Ratter, Member of the British Transport Commission and Chairman of the International Union of Railways; Mr. Segalat, Chairman of the Board of Directors, Société Nationale des Chemins de Fer Français; Mr. Dargeou, General Manager, S.N.C.F.; Mr. Antonini, Secretary-General, S.N.C.F.; Mr. De Vos, Société Nationale des Chemins de Fer Belges; Mr. Musquar, General Manager, Luxembourg National Railways; Mr. J. L. Harrington, Chief Shipping & International Services Officer, British Transport Commission, and Mr. G. M. Leach, International Traffic Officer, B.T.C., Chairman of the First Committee of the U.I.C. Among the symbolic emblems depicting Mr. Armand's activities carved on the hilt of the sword is an electric locomotive. In the illustration which appears on this page, Mr. Armand is shown receiving the sword.

Mr. R. Maudling (centre) in the applied research department of Alfred Herbert Limited. Also shown are Mr. B. C. Harrison, Director of Designs (left), and Colonel C. W. Clark, Chairman

Questions in Parliament

Victoria line : estimated cost

Mr. E. C. Redhead (Walthamstow W.—Lab.) asked the Minister of Transport on June 21 whether he would give the latest estimate of the capital cost of constructing the proposed Victoria Line.

Mr. Marples, in a written answer, said that it would be £55 million. If the interest on this sum was capitalised for the period of construction, the full capital cost at current rates of interest would be about £64 million.

Colour-bar on railways

Mr. John Stonehouse (Wednesbury—Lab.) had notice of question to the Minister of Transport for oral answer on June 21 to ask him if he would give a general direction to the British Transport Commission not to permit racial discrimination in connection with employment of staff.

Mr. G. R. Strauss (Lambeth Vauxhall—Lab.) also wished to ask the Minister if he would give a general direction to the British Transport Commission to ensure that no racial discrimination was practised in the engagement of its employees.

In a written answer to both, the Minister said that he was assured by the Chairman of the British Transport Commission that it was already the policy of the Commission that no colour-bar should apply in the engagement of its employees.

Future branch line closures

Mr. James Boyden (Bishop Auckland—Lab.) asked the Minister of Transport on June 21 if he would give a general direction to the British Transport Commission that when the Commission was proposing the closure of a branch line it should refer to the appropriate consultative committee all curtailment of services envisaged by the Commission within the next three years which could affect the rail services offered in the area.

Mr. Marples, in a written answer, said that it was for the committees to decide what information they required in considering closure proposals.

Presentation to Mr. Louis Armand by Mr. Rene Cassin

Staff & Labour Matters

Shorter working week

The Employees' Side of the Railway Shopmen's National Council has decided to refer its claim for a 40-hr. week for railway workshop staff to the Industrial Court.

The British Transport Commission had already offered to reduce the standard working week from 44 hr. to 42 hr. provided satisfactory means could be found of cushioning the impact of the two-hr. reduction and had suggested to the Employees' Side that a joint working party be set up to examine rostering arrangements and so on.

The Employees' Side has rejected this offer because the Commission was not prepared to indicate the operative date of the reduced working week until the method of implementation had been examined by the proposed joint working party. In the circumstances, the Employees' Side has decided to refer its original claim, which is for a reduction of 4 hr. in the standard week, to arbitration.

The N.U.R., which is represented on the Employees' Side of the Shopmen's Council, has agreed to participate in a joint working party to consider the implementation of a 42-hr. week for railway conciliation grades.

The T.S.S.A., which represents the salaried grades, has referred its claim for a 38-hr. week of five days to the Railway Staff National Tribunal, which will hear the claim on July 12.

CONTRACTS AND TENDERS

£11 million signalling equipment order for Pakistan Railways

Siemens & Halske Akt. has received an order for signalling equipment from the Pakistan Government worth £11 million, for use on the Pakistan Western and Eastern Railways.

Ruston & Hornsby Limited has received an order from the British Transport Commission to supply 14 diesel-electric locomotives. The locomotives are for use at Southampton Docks and are worth £200,000.

Pressed Steel Co. Ltd. has received an order from the British Transport Commission for 50 road-railers to be used on experimental trains early next year.

Leyland Motors Limited has received an order for a 6-ton Scammell Scarab motive unit and 6 Scammell drop-frame semi-trailers from the Sierra Leone Government Railway. They will be an addition to the present fleet used on general haulage and deliveries in Freetown.

British Railways, Eastern Region, has placed the following contracts:—

W. & C. French Limited: construction of a reinforced concrete culvert under Underline Bridge No. 1588 between Shippea Hill and Lakenheath

Constable Hart & Co. Ltd.: resurfacing of roadways in the Kings Cross and Stratford districts

Walter Cowen Limited: repairs to roofs over platforms Nos. 3 to 8 at Liverpool Street Station

Thomas Fletcher & Co. Ltd.: repairs to arch soffit and spandrel walls, etc., of Underbridge No. 600 at Cantrell Road, between Stepney and Bow Junction

Walter Lawrence & Son Ltd.: provision of new car park at Enfield Town Station

Carter-Horseley (Engineers) Limited: construction of footpath on the north side of Keadby Lift Bridge No. 36 over River Trent, between Althorpe and Scunthorpe & Frodingham.

British Railways, North Eastern Region, has placed the following contracts:—

T. E. Cundy & Son: painting the North Road Locomotive Works, Darlington, and painting bridges at Darlington, between Ferryhill and Northallerton and on the Leeds to Newcastle line

Baxter Bros. Limited: painting of bridges in the Newcastle District including the High Level Bridge at Newcastle

Berwick Building Co. Ltd.: provision of a compressor house and relay room for the new signal box at Gateshead

Concrete Services Limited: supply of prestressed concrete beams for Pontefract Road and Robin Hood Branch bridges at Stourton

Steel Equipment Co. Ltd.: provision of partitioning and steel shelving for the stores at North Road Locomotive Works

Ericsson Telephones Limited: provision of a new telephone exchange at Darlington Bank Top Station and Satellite at Shildon Wagon Works

Westinghouse Brake and Signal Co. Ltd.: provision and installation of signalling equipment for a new signal box at Hessle Road, Hull

Nicholson, Harlow & Co. Ltd.: provision of an electric sub-station at Healey Mills

D. Humberstone & Co. Ltd.: painting of York Carriage Works

Firth Blakeley Limited: provision of a diesel fuelling installation at Thornaby Motive Power Depot

A. Monk & Co. Ltd.: installation of lighting tower foundations at Newport Marshalling Yard

Brightside Heating & Engineering Co. Ltd.: provision of heating installation in the Yardmaster's Offices at Newport Marshalling Yard

Pavior Construction Co. Ltd.: extension of High Dock at Keighley North Goods Yard. Road repairs in the Hull District

Turnerised Roofing Co. Ltd.: turnerising of Goods Warehouse roof at Brighouse

Cawood Wharton & Co. Ltd.: erection of goods handling shed, amenities block, checkers office, sundry small buildings, and alterations and additions to existing buildings at Bradford Valley Goods Depot. Conversion of existing hostel into offices, and alterations to the repair shed and fuelling facilities at Leeds Holbeck Motive Power Depot

Ruddock & Meighan Limited: strengthening and raising of road bridge over the railway at Thwaites Station, near Keighley

Dowsett Engineering & Construction Co. Ltd.: construction of embankments, ballasting and drainage in connection with the construction of new marshalling yard at Lamesley

F. H. Sutcliffe Limited: accommodation for servicing Automatic Warning System equipment at York

B. & S. Massey Limited: provision of a tyre retaining-ring fixing machine at North Road Locomotive Works, Darlington

McLauchlan (Knottingley) Limited: slag ballasting and earthworks in connection with the construction of the new marshalling yard at Healey Mills

Brightside Heating & Engineering Co. Ltd.: provision of heating in the Up Yard control building at Newport Marshalling Yard

Wm. Latimer & Co. Ltd.: painting of bridges at Darlington and in the Darlington and Newcastle districts, Ouseburn and Howdon viaducts and bridges on the line from Bishop Auckland to Ferryhill.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Greece:

25 tarpaulins for covering freight wagons.

The issuing authority is the Purchasing & Stores Department, Hellenic State Railways, (S.E.K.), 34 Themistocleous Street, Athens, to which bids should be sent. The closing date is July 7. The tender No. is 5069. The Board of Trade reference is ESB/20812/61.

From South Africa:

494 items of bolts and nuts.

The issuing authority is the Stores Department, South African Railways, and tenders should be addressed to the Chairman of the Tender Board, S.A.R., P.O. Box 7784, Johannesburg. The closing date is July 21. The tender No. is D8640. The Board of Trade reference is E.S.B./20438/61.

Three electric-motor driven, heavy-duty, electric unit and carriage and wagon wheel lathes

Three sets electric lighting equipment

One set velo-prints.

The issuing authority is the Stores Department, South African Railways, and tenders should be addressed to the Chairman of the Tender Board, S.A.R. P.O. Box 7784, Johannesburg. The closing date is August 18. The tender No. is G.8687. The Board of Trade reference is E.S.B./20440/61.

6 four-wheeled, petrol-engined pneumatic tyred, industrial-type fork-lift trucks with a lifting capacity of 4,000 lb. at a 24 in. load centre

1 similar fork-lift truck, with a lifting capacity of at least 6,000 lb.

The issuing authority is the Stores Department, South African Railways, and tenders should be addressed to the Chairman of the Tender Board, S.A.R., P.O. Box 7784, Johannesburg. The closing date is July 21. The tender No. is F8698. The Board of Trade reference is E.S.B./20439/61.

1,000 Teflon hoses ½ in. bore with J.I.C. swivel-type couplings, assembled length 3 ft.

50 Teflon hoses ¾ in. bore with J.I.C. swivel-type couplings, assembled length 3 ft. 5 in.

The issuing authority is the Stores Department, South African Railways, and tenders should be addressed to the Chairman of the Tender Board, S.A.R., P.O. Box 7784, Johannesburg. The closing date is July 28. The tender No. is K8733. The Board of Trade reference is ESB/20865/61.

From Sudan :

Two 3-operator A.C. transformer welding sets.

The issuing authority is the Controller of Stores, Sudan Railways, Stores Department, Atbara, to whom bids should be sent. The closing date is August 10. The tender No. is 2404. The Board of Trade reference is E.S.B./20097/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Lost umbrellas. The London Transport Executive has announced an all-time record for umbrellas forgotten in buses and on Underground trains during last year. The total was 90,984, of which 40 per cent were claimed.

Electrification poster issued by the London Midland Region of British Railways

Electrification posters. The London Midland Region of British Railways has issued a series of posters describing work to be carried out on the electrification of the main lines from Euston to Manchester and Liverpool. One of the posters is illustrated above.

Bus fares rise. The Northern Area Traffic Commissioners have granted an application to increase fares by United Automobile Services Limited, Darlington. The increases will come into force in July.

Colour-light signalling. The completion of the colour-light signalling installation between Gas Factory function and Barking on the Eastern Region of British Railways gives colour-light signalling throughout the line from Fenchurch Street to Shoeburyness —39½ miles and 357 signals.

Main line speed-up. The Eastern Region of British Railways is to speed up considerably some of the services on the Great Northern main line with the introduction of the winter timetable if the Deltic locomotives at present on order are delivered in time. The reduction in overall timing to places such as Newcastle and Leeds will mean higher speeds than obtained hitherto on certain parts of the line.

Sea voyaging, 1961. Thos. Cook & Son Ltd. has issued its annual publication on sea voyaging which contains sea trips and cruises to cater for holidays of any length ranging from a fortnight's cruise to a round-the-world trip lasting 76 days.

Routemaster coaches for Green Line. The London Transport Executive has ordered 68 Routemaster vehicles designed specially for use on Green Line routes. The new coaches will be classified C.R., and fleet numbers included in the existing Routemaster series.

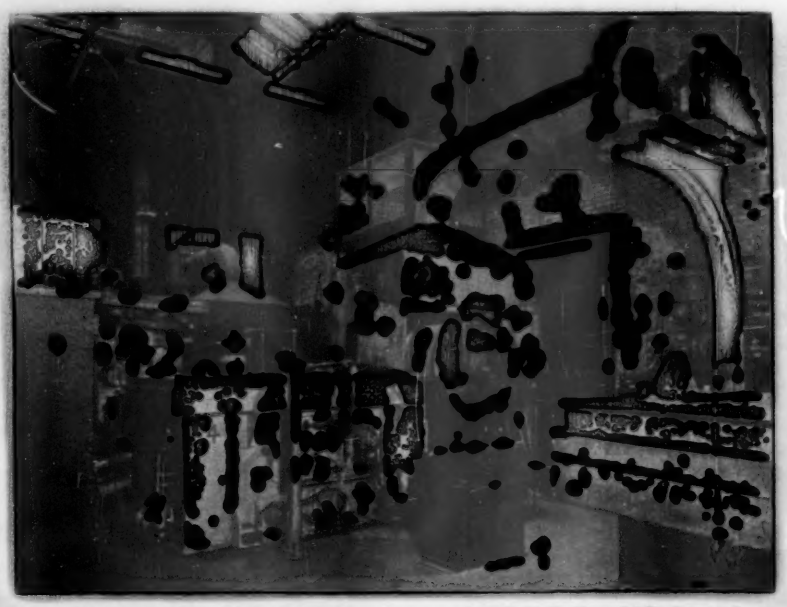
Tourist record. The number of visitors to Britain during the first four months of this year is a record. The British Travel & Holidays Association's figures recently released reveal that visitors during the period were almost equal to the total for the whole year when the " Come to Britain " campaign was launched.

Air terminal over Victoria Station. An air terminal is to be built over the platforms at the British Railways, Southern Region station, at Victoria, by British United Airways. It was recently announced that agreement with British Railways had been reached, and work is expected to commence before the end of the year.

Enfield rolling mills. Major plant extensions have been completed at the Brimsdown, Enfield, Middlesex, factory of Enfield Rolling Mills Limited. Storage and dispatch facilities have been erected for delivery direct to customers and provision made for expansion. The furnace floor is illustrated below.

Continental service pamphlets. Two of the three recently-issued pamphlets by British Railways Eastern Region give services and fares to Scandinavia and Switzerland via Harwich and Hook of Holland. The third is concerned with sleeping car facilities to Belgium by both the Harwich and Dover routes. The cover is reproduced in the illustration which appears above.

Cover of continental service pamphlet issued by the Eastern Region



The furnace floor at the Brimsdown factory of Enfield Rolling Mills Limited

Out-of-gauge load of girders en route to Stapleford & Sandiacre

Out-of-gauge load. The illustration above shows a load of bridge girders leaving Cargo Fleet Station for Stapleford & Sandiacre. This consignment was described on page 696 of our issue of June 16.

Shenfield ticket office. The passimeter at Shenfield Station on the Eastern Region of British Railways has been replaced by a ticket office equipped with both Flexiprint and Multiprint ticket issuing machines.

B.T.C. exhibition. Models and drawings of new railway stations for London and Birmingham will be on public view at the British Transport Commission's exhibition "New Architecture in Transport," at the Ceylon Tea Centre, Regent Street, London, from July 3-6.

Diesel traction school. Next Wednesday, July 5, Sir William Stanier, who was Chief Mechanical Engineer of the London Midland & Scottish Railway from 1932-44, will open a school for training engine drivers on diesel traction at Derby, on the London Midland Region of British Railways. This will provide an electrical course to supplement their practical training on the footplate.

Bearing factory at Irvine. The Skefco Ball Bearing Co. Ltd. is building a factory for the manufacture of ball and roller bearings at Irvine, Ayrshire. The Chairman of the company, Sir Victor A. L. Mallet, laid the foundation stone on June 20 and the factory is expected to start production this autumn.

Rhodesian mileage record. A 2,000 h.p. diesel locomotive, No. 1208, built by the English Electric Co. Ltd., has achieved the performance of 14,062 miles in a month on Rhodesian Railways. It is one of 35 DE2 main-line units which are claimed to be the most powerful diesel-electric locomotives ever built for a narrow-gauge system. The availability figure of the locomotive was roughly 90 per cent.

West Midlands publicity. A diagrammatic map of the West Midlands lines of the London Midland Region of British Railways has been produced. The map, timings of trains, and details of second class cheap fares, are contained in a folder produced by the Region. A similar map is being fitted in diesel trains based on the West Midlands area.

Closed-circuit television at Paddington. To speed up internal communications, a closed-circuit television network, transmitting minute-by-minute information on the running of all trains to Paddington, has just been installed in the London Division Passenger Control room at Paddington by the Western Region of British Railways. Information is received simultaneously on 17-in. sets without sound in the Arrival Signalbox, the Train Indicator Office on the "Lawn," the Inspector's Offices at the adjacent Shunting Yard and Running & Maintenance Department, the Enquiry Office on the station and by the Central Enquiry Bureau in Bishops Bridge Road.

Aberdeen-Ballater Sunday service. From July 9–August 27 the Sunday service from Aberdeen will be at 10.15 a.m., 2.30 p.m., and 6.30 p.m., and return from Ballater at 11.45 a.m., 5 p.m., and 8 p.m.

S.N.C.F. presentation. The French National Railways have presented a Pye international marine radiotelephone to the Dieppe lifeboat committee. This will work into the Dieppe Railway Radio Station, in addition to the local public communications scheme.

Bakelite exhibit. A display of Warelite will be a feature of the exhibit of Bakelite Limited at the International Plastics Exhibition. This is being held at Olympia, June 21-July 1. Coloured transparencies will also be on view showing the installation of this material aboard the *Empress of Canada*.

Training week in Nairobi. The East African Railways & Harbours held an exhibition during Commonwealth Technical Training Week in Nairobi, the theme of which was "Training today for tomorrow." The illustration below shows two young Kenya students visiting the exhibition.

Ceylon Min'ster's visit. The Ceylon Acting Minister of Labour & Nationalised Services, Mr. M. P. de Z. Siriwardene, M.P., who has been visiting this country and studying transport and labour problems, was entertained at a reception given by the Chairman and Members of the United Kingdom Railway Advisory Service at the Savoy Hotel, London, on June 21.

G.E.C. locomotives in U.S.A. Ten 4,400 h.p. electric locomotives built by the General Electric Co. Ltd. are in service on the Pennsylvania Railroad Company's system. These are part of an order for 66 such units; delivery of the balance is due to be completed

Students examine the East African Railways & Harbours Commonwealth Technical Training Week exhibit at Nairobi

in 1963. The locomotives operate on an 11,000 V, 25-cycle a.c. supply, converted to d.c. by 12 mercury-arc rectifier tubes.

Imported bearings. The Board of Trade has announced that imported ball and roller bearings with an outside diameter of not more than 12·7 mm, may in future have the country of origin marked on the wrapper or container. Hitherto the marking was required to be on the outer ring of the bearing.

Container service to Ireland. The two ships specially built for container traffic introduced on the British Railways, London Midland Region route between Heysham and Belfast, together with ordinary cargo vessels, provide a total of 18 sailings a week in both directions, between these ports, on which containers can be carried. Backing the cross-channel container service is a network of express freight trains connecting Heysham with all parts of England and Wales.

"Condor" container service. The "Condor" overnight express-freight service between London and Glasgow, inaugurated by the London Midland Region of British Railways in 1959, has been steadily winning back freight traffic. Since the beginning of the year 3,700 containers have carried pottery, glass, textiles, hardware and, in season, fresh fruit from the South of England, to be delivered in Glasgow the morning after despatch.

Railway Stock Market

Uncertainty and a waiting attitude in stock markets have made for a fresh reaction, though falling off in demand, rather than selling was the main market factor.

There was not a lot of business to test quotations for foreign rails, but Antofagasta ordinary stock at 18½ more than held last week's rise, though on the other hand, the preference stock came back from 34xd to 33xd. United of Havana second income stock remains at 5½, and elsewhere, Mexican Central "A" bearer debentures were again 59. San Paulo Railway 3s. units eased from 2s. to 1s. 11½d.

Costa Rica ordinary stock was 41½ and Chilean Northern 5 per cent first debentures 50. Brazil Railway bonds were 3¾, Guayaquil & Quito assented bonds 57½ and Paraguay Central prior debentures 18½. International of Central America common shares were $18¼ and the preferred stock $100.

Canadian Pacifics moved back, mainly with the trend of Wall Street, and were $46¼, compared with $46¾ a week ago. The 4 per cent debentures fell from 55⅝ to 54¾, but the 4 per cent preference stock rose on balance from 58¼ to 58½. White Pass shares eased from $11⅞ to $11½.

Nyasaland Railways shares remained at 11s. and the 3½ per cent debentures were 32. Midland of Western Australia £1 units of second debentures were quoted at 11s. In other directions, West of India Portuguese capital stock changed hands at 146 at one time. Barsi Light Railway ordinary stock was again quoted at 17. Gedaref Railway & Development 5 per cent guaranteed debenture stock was 97.

Shares of locomotive building and engineering companies have been steadier, though the more active shares, which reflect the prevailing market trend closely, have recorded further declines on balance. Westinghouse Brake were 40s. 9d. compared with 43s. 3d. a week ago. Wagon Repairs 5s. shares eased to 20s. and Gloucester Wagon 16s. shares to 9s. 6d., but G. D. Peters were quoted higher at 20s. Beyer Peacock 5s. shares have been a little firmer at 7s. 10½d. and also Charles Roberts 5s. shares at 7s. 3d. Birmingham Wagon declined further from 26s. a week ago to 24s. 6d. North British Locomotive were a few pence easier at 6s. 1½d.

Among electricals, English Electric came back from 35s. 3d. to 34s. 9½d. despite the statement in the take-over offer for W. H. Dorman that English Electric expects to pay an unchanged 3 per cent interim dividend, and that barring unforeseen circumstances to keep the final dividend on larger capital at 7 per cent. A.E.I. at 40s. 6d. were maintained on balance, and G.E.C. at 34s. 6d. were also well maintained. B.I.C.C. eased from 60s. 9d. to 60s. and Mather & Platt from 43s. 9d. to 42s. 3d., but after the rise which followed the improved results, Johnson & Phillips have come back from 24s. to 22s. 3d.

Pressed Steel 5s. shares declined from 24s. 3d. a week ago to 23s. and Dowty Group 10s. shares at 35s. 9d. were maintained on balance, but Ransom & Marles 5s. shares eased to 18s. 3d. and Pollard Bearing 4s. shares have been steady at 38s. British Oxygen 5s. shares held up quite well at 20s. 4½d., but elsewhere, Leyland Motors came back from 93s. 1½d. to 91s. 10½d. Steel shares lost ground on the news of the lower trend of profits shown in half-yearly statements.

Forthcoming Meetings

June 30–July 3 (*Fri.-Wed.*). Railway Students Association annual convention at Oriel College, Oxford.

July 1 (*Sat.*). The Permanent Way Institution, visit to Plymouth. Joint meeting with Exeter & West of England Section.

July 1 (*Sat.*). The Railway & Canal Historical Society, boat trip on the Staffordshire & Worcestershire Canal.

July 9 (*Sun.*). The Railway Correspondence & Travel Society, Borders scenic rail tour.

July 15 (*Sat.*). The Permanent Way Institution, East Anglia Section. Visit to remodelling of Colchester North Station.

July 16 (*Sun.*). The Stephenson Locomotive Society. Special train to Annesley, Shirebrook (G.C.), and Mexborough Sheds, and Doncaster Works and Sheds from Birmingham, New Street.

July 16–17 (*Sun.-Mon.*). Railway Canal & Historical Society. 200th Anniversary of opening of Bridgewater Canal.

July 20 (*Thu.*). The Model Railway Club, at Keen House, Colshot Street, N.1, at 7.45 p.m. "R. W. Urie and his Locomotives," by Mr. T. C. Britten.

July 23 (*Sun.*). The Railway Enthusiasts' Club, North Lincolnshire area tour from Doncaster.

July 29 (*Sat.*). The Permanent Way Institution, London Section. Visit to Colchester Station reconstruction and Harwich Ferry terminus.

OFFICIAL NOTICES

CITY OF SHEFFIELD
SEWAGE DISPOSAL DEPARTMENT—CONTRACT NO. D.M. (D.S.) 18
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TENDERS are invited for the supply and delivery of up to 35 Steel Side-tipping Railway Wagons of 420 cu. ft. capacity for standard gauge track. Forms of Tender, Conditions of Contract and Specifications may be obtained from the undersigned on deposit of a fee of three guineas which will be refunded on receipt of a bona fide Tender.

Tenders, in the official envelope provided (which must bear no indication of the Tenderer), must be delivered to the Town Clerk, Town Hall, Sheffield, 1, not later than 10 a.m. on Thursday, July 13, 1961.

JAS. H. EDMONDSON,
General Manager and Engineer.

General Manager's Office,
Sewage Disposal Department,
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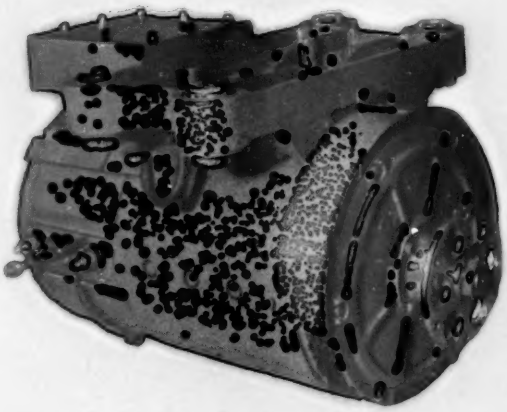

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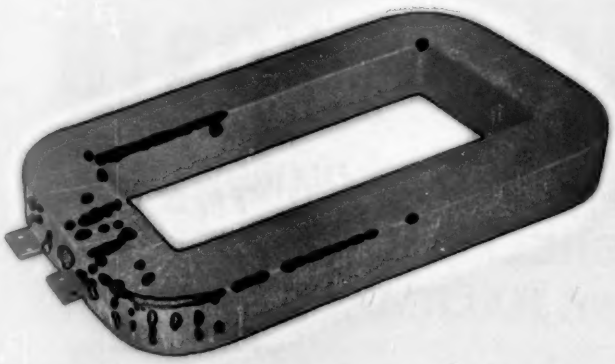

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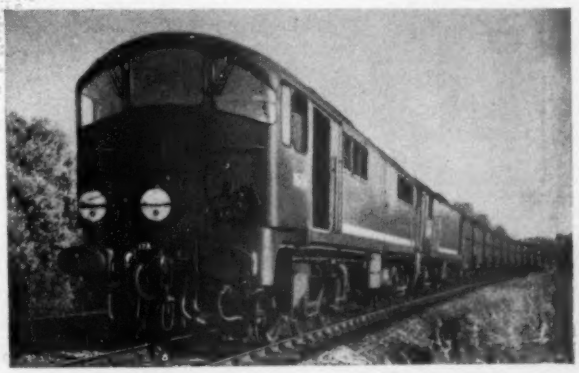

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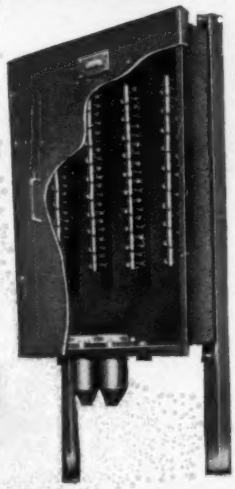

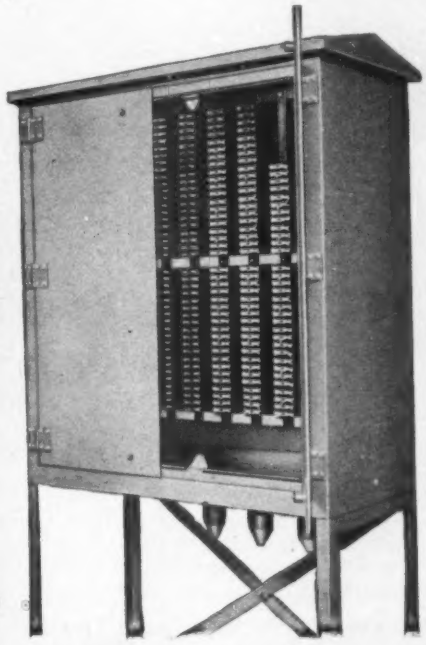

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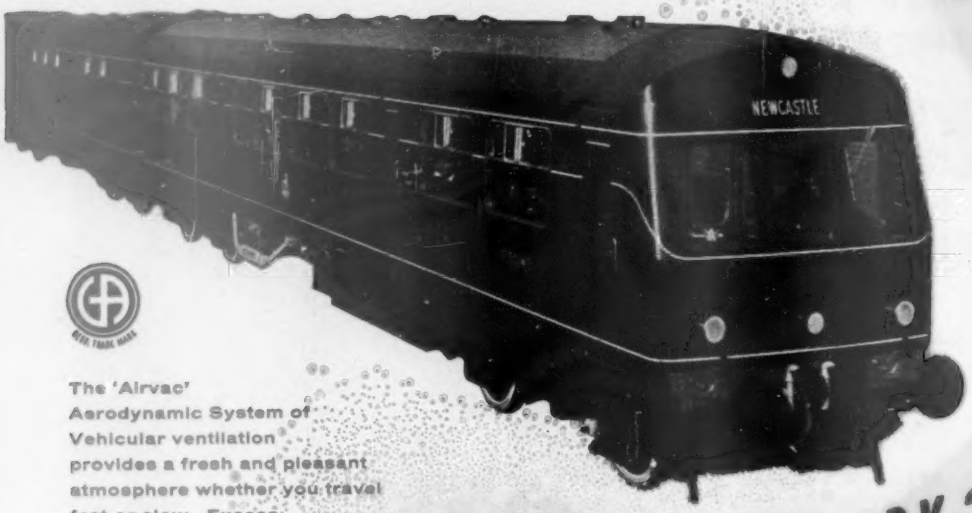

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June 30, 1961

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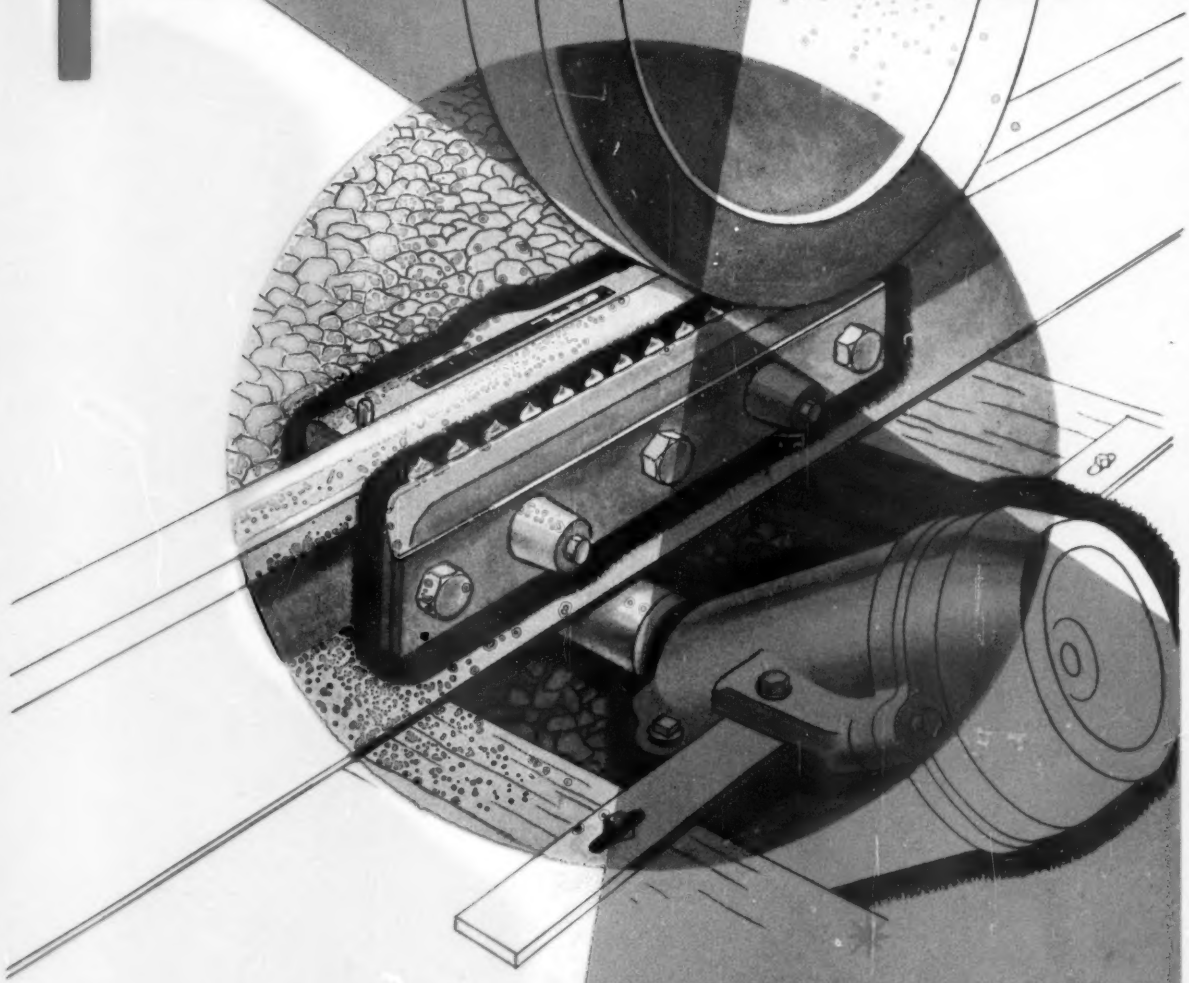

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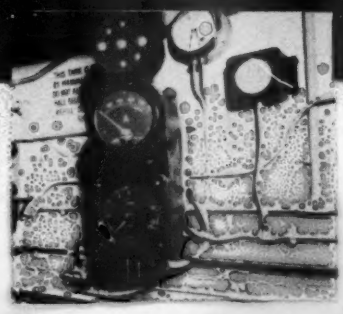

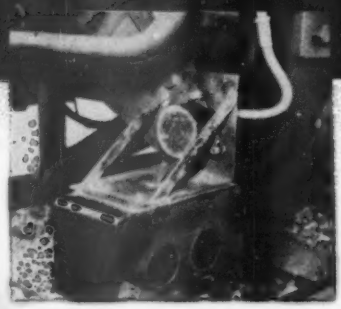

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AEI-GRS Equipment at Margam, British Railways, Western Region. (*Left*) Hump signal and crest of hump. (*Centre*) Interior of shunting locomotive cab showing hump repeater signal. (*Right*) Receiving coils mounted under shunting locomotive. (Photographs by courtesy of British Railways)

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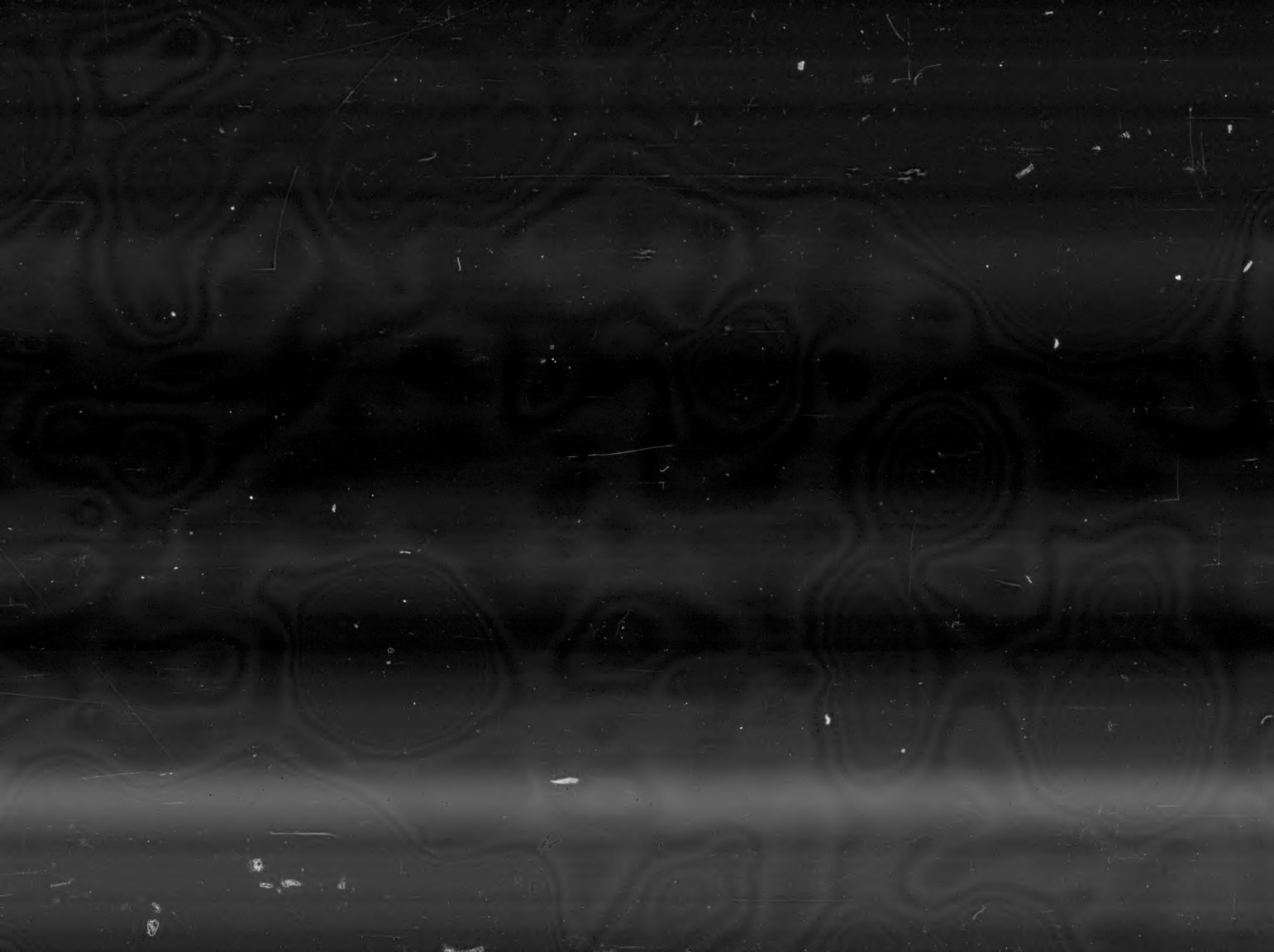
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